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Pleistocene Edentates of the West Indies

By Carlos de Paula Couto[1]

INTRODUCTION

In 1951–1952, after finishing a study of the important collections of fossil edentates of the Pleistocene of Cuba, Puerto Rico, and Haiti, in the American Museum of Natural History, the Museum of Comparative Zoology at Harvard University, and the United States National Museum of the Smithsonian Institution in Washington, I intended writing a revisionary monograph of the West Indian edentates in general, to bring up to date all our knowledge concerning them.

With the extensive notes I made in those museums and illustrations and bibliographies that I also obtained, as well as abundant information and photographs sent to me later from Cuba by Prof. Oscar Arredondo and Prof. Antonio Nuñez Jimenez on the rich collections made in that country by the Sociedad Espeleológica de Cuba and by the Grupo de Exploraciones Científicas of Havana, I could proceed with the project.

The reason that this work was not finished earlier is that I had hoped to visit Cuba and to study intensively the collections referred to above, at the invitation of Professor Arredondo. Unfortunately, insurmountable difficulties prevented my doing so.

A systematic revision of the genera and species described for those islands, from Cuba to Curaçao, is here presented.

I recognize that, on the basis of the fossil material already collected, principally the large collections made recently in Cuba, there is still much to do on the subject. The Cuban paleontologists, particularly,

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have a great deal of work before them to describe in detail the important material reunited by the two above-cited societies and by private collectors, which includes at least two almost complete skeletons of species known until now only by fragments of skulls, mandibles, and other scattered skeletal remains.

Some of the genera and species herein accepted still depend on future discoveries and more accurate studies in order to be definitely confirmed or included in the synonymy of others that are already definitely established.

I hope that the present paper will be an incentive and a guide to the young Cuban paleontologists in the meticulous study of the excellent collections they have been able to gather in their museums and other specialized institutions. A good description of such collections may give us much valuable data for a better understanding of the extinct forms of that country, and of their geological ages which extend, it seems, between the Upper Pleistocene and the Recent.

Abbreviations

A.M.N.H., the American Museum of Natural History
G.I.U.A., Geological Institute of the University of Amsterdam
M.N.H.N., Muséum National d'Histoire Naturelle, Paris
M.N.R.J., Museu Nacional, Rio de Janeiro
M.P.U.H., Museo Poey de la Universidad de la Habana
S.E.C., Sociedad Espeleológica de Cuba
U.S.N.M., United States National Museum, Smithsonian Institution, Washington

HISTORICAL SUMMARY OF THE DISCOVERIES

The first registered discovery of fossil remains of mammals of the order Edentata in the West Indies was made by José Figueroa, in the region of the thermal baths of Ciego Montero, Província de Las Villas, Cuba, in April, 1860. It was an incomplete mandible of *Megalocnus rodens* with teeth, which was given to Felipe Poey who announced the discovery before the Academia de Ciencias de La Habana on September 15, 1861, believing that the mandible was that of a giant rodent.

Castro (1864) published a note on the specimen, accompanied by good illustrations (fig. 2). Based on Castro's note, Leidy (1868) verified the fact that the fossil belonged to a new form of ground sloth, for which he proposed the name *Megalocnus rodens.* A few months later, Pomel (1868), with the original specimen in hand (it was sent to Paris by Castro for the exposition of 1867), described it under the name of *Myomorphus cubensis,* subgenus of *Megalonyx.*

Ten years elapsed before new explorations were made in Cuba for fossils, because of political disturbances caused by the revolution of October 10, 1868.

In 1886 and 1892, Carlos de la Torre examined other fragmentary remains collected in Remédios and Las Villas, following which a new revolution postponed other investigations for several more years. Carlos de la Torre collected additional material in *casimbas* (water pits filled with alluvial material) in the locality of Ciego Montero, and in the Sierra de Jatibonico, in 1910.

Barnum Brown, working for the American Museum of Natural History, explored deposits of *casimbas* in the same localities on two trips to Cuba in 1910 and 1918. During the first trip he had the help of Carlos de la Torre. Rich collections of fossil vertebrate remains, particularly Edentata, were obtained, principally during the expedition of 1918 when the *casimbas* of Ciego Montero were completely explored.

Anthropologists under the direction of Franz Boas, while exploring caves in Puerto Rico in 1915, discovered fossil remains of rodents and of a ground sloth. This fact induced H. E. Anthony to work there, under the auspices of the New York Academy of Sciences, in 1916, when abundant collections of fossil material of mammals, including edentates, were made.

Important discoveries of fossil remains of mammals were made directly afterward by R. Fernandez Maceira of Río Piedras, Puerto Rico, and sold to the American Museum of Natural History from 1920 on. The ground sloth bones came from a cave in Cabachuelas, Torrecillas, near Morovis.

In 1919, W. D. Matthew published two notes on the Cuban fossil mammals, proposing the new generic names *Mesocnus, Miocnus,* and *Microcnus* for three new groups of ground sloths that he recognized.

In 1921, J. S. Brown and W. S. Burbank, in the course of geological prospecting in Haiti under the direction of the United States Geological Survey, examined two caves in the northeastern region of the Dominican Republic and collected some fossil bones which were sent to Gerrit S. Miller, Jr., in Washington. In addition to remains of rodents and man, Miller identified some vertebrae and a proximal fragment of a radius of an immature ground sloth, doubtfully classified by him as *Megalocnus.*

In the spring of 1925, Miller worked for four weeks on the plantation of Atalaya, near St. Michel, in Haiti, with good paleontological results. Fossil material of Insectivora, Chiroptera, Rodentia, and Edentata was obtained in caves of the region.

Anthony, in 1926, described under the names of *Acratocnus odontrigonus*

and *A. major* the fossil remains of ground sloths of Puerto Rico, referred to above.

In February and March, 1928, Gerrit S. Miller, Jr., visited the area around the bay of Samaná, in the northeastern part of the Dominican Republic, and obtained skeletal remains of mammals which could have been killed and eaten by Indians. Among those remains was a phalanx which was doubtfully ascribed to *Acratocnus comes* Miller (1929b).

An incomplete right femur from Atalaya, near St. Michel, Haiti (see above), was also described by Miller in 1929 as the type of a new species, doubtfully ascribed to *Acratocnus* (*A. comes* Miller, 1929a). Another incomplete right femur, from the same locality, was made the type of a new species and genus, *Parocnus serus* Miller, 1929.

Explorations by Arthur J. Poole and others, in 1927, 1929, and 1930, in caves situated in the massif of La Salle in Café (Gonave Island), Haiti, and in the neighborhood of Constanza in the mountainous hinterland of the Dominican Republic resulted in the collecting of copious osteological material of Recent and extinct Insectivora, Chiroptera, Rodentia, and Edentata (see Miller, 1930). The scarce remains of Edentata (upper caniniform tooth, incomplete molar, four metacarpals, two phalanges, a fragment of a vertebra) were classified by Miller as of *Acratocnus comes.*

In 1931, an extract of Matthew's incomplete manuscript on the Cuban edentates (collections of 1911 and 1918 referred to above; see Matthew, 1931) was published, with the diagnoses of the genera and species described by Matthew (*Mesocnus browni* and *M. torrei; Miocnus antillensis; Microcnus gliriformis*).

José Alvarez Conde reviewed in 1951 what was known about the Cuban ground sloths, including the point of view of several authors as to their interactions with man (Indian).

Hoffstetter in 1955 announced the discovery of a fragmentary mandible of an extinct ground sloth of the family Megalonychidae (*Acratocnus* cf. *A. comes* Miller) in a cave of the bay of Samaná, island of Haiti. The fossil was discovered by Pinard several years before and is in the Muséum National d'Histoire Naturelle in Paris.

While in the American Museum of Natural History in 1951, I studied the collection of fossil edentates from Cuba obtained during the above-mentioned explorations of 1911 and 1918 and completed Matthew's original manuscript on the same collection. This joint paper (Matthew and Paula Couto, 1959), which included my study of the fossil material in the Museum of Comparative Zoology at Harvard, is a complete report on that collection (in part returned to the Museum Poey in Havana,

some specimens having been sent to the Museu Nacional in Rio de Janeiro). Four genera of extinct Cuban ground sloths were recognized in that paper: *Megalocnus* Leidy, 1868; *Mesocnus* Matthew, 1919; *Microcnus* Matthew, 1919; and *Acratocnus* Anthony, 1916 (actually *Miocnus* Matthew, 1919, then considered erroneously by me as a synonym of *Acratocnus*). This monograph was preceded in 1956 by a note on *Megalocnus rodens* (Paula Couto, 1956).

Oscar Arredondo, on the basis of very incomplete fragmentary mandibles from the Pleistocene of Cuba, proposed in 1961 two new and doubtfully valid genera (*Neomesocnus* and *Neocnus*) of ground sloths. One of these (*Neocnus*) is probably a synonym of *Microcnus* Matthew.

In 1962, Hooijer announced the discovery by P. Stuiver of fossil bones of a ground sloth in a bone-bearing deposit filling a pocket in a presumably Pleistocene dolomitized limestone, approximately 150 meters above sea level, on the Tafelberg Santa Barbara, eastern Curaçao, Netherlands Antilles. The fossils were described by Hooijer (1962) as new species of a new genus (*Paulocnus petrifactus* Hooijer, 1962).

Hooijer (1962) cited the discovery of remains of mammals and of other animals at the Indian site Sint Jan II, in Curaçao, in March, 1960. The material, including an imperfect axis vertebra of an immature ground sloth, presumably *Paulocnus petrifactus* Hooijer, dates from 1000 to 1500 A.D., and is therefore late pre-Columbian. In Curaçao, as well as in the Greater Antillean Islands, ground sloths existed, according to Hooijer, as contemporaries of man and may have been the last survivors of the group.

Finally, Hooijer (1964) published an additional note on *Paulocnus petrifactus,* with a revised diagnosis.

The great work that has been realized in Cuba by groups of young speleologists and paleontologists in the last decades merits special reference. Abundant collections of important fossil material of mammals (Edentata, Rodentia, and Insectivora), reptiles, and birds of extinct Pleistocene and perhaps sub-Recent species have been made in limestone caves in several Cuban provinces (see fig. 1). Among these important discoveries are almost complete skeletons of species known until recently only from few and fragmentary skeletal remains (*Mesocnus torrei,* for instance).

The paleontological discoveries up to 1954 by the Sociedad Espeleológica de Cuba, referring to the order Edentata, may be summarized as follows from Oscar Arredondo's communications:

June, 1946: "Cueva de los Niños," in Cayo Salinas, northeastern Caibarien, *Las Villas Province, several remains of Mesocnus torrei* and *Megalocnus rodens.*

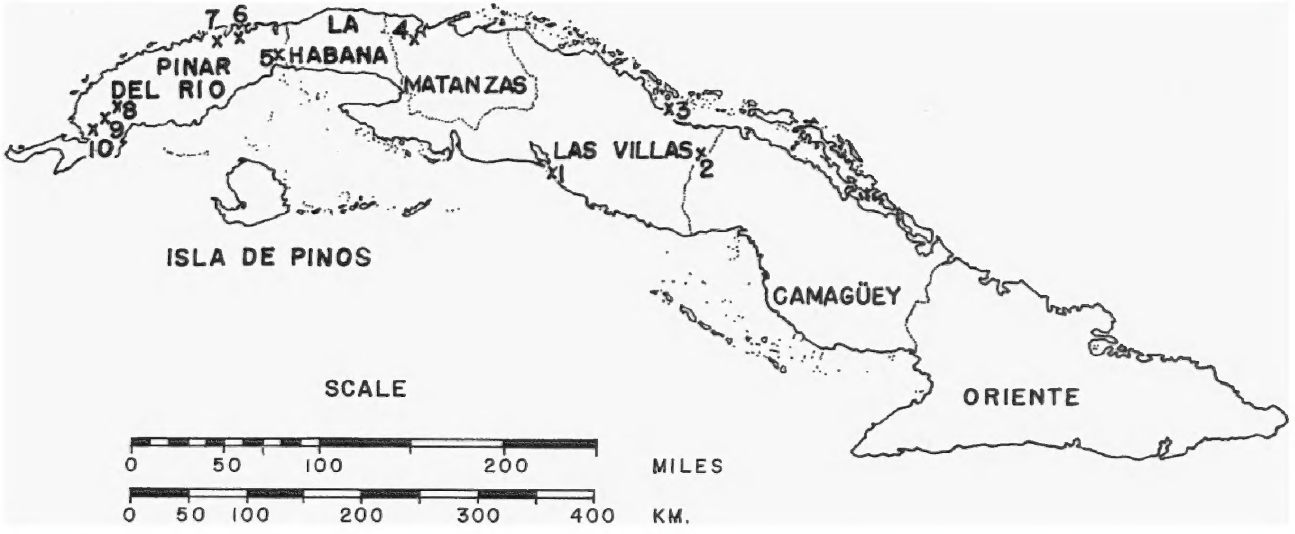

FIG. 1. Schematic map of Cuba, with indications of the localities where fossil edentates were found. Las Villas Province: 1, Ciego Montero; 2, Casimba, Sierra de Jatibonico; 3, Cayos Salinas y Lucas. Matanzas Province: 4, Cueva de Bellamar. La Habana Province: 5, San Antonio de los Baños. Pinar del Río Province: 6, Santa Fé; 7, Anafe; 8, Quemado de Pineda; 9, Sumidero; 10, Guane. The associated fauna included also rodents, insectivores, Aves, Chelonia, and Crocodilia. After Arredondo.

August, 1948: "Cueva de Bellamar," level with the floor, in Matanzas, Matanzas Province, remains of *Megalocnus rodens, Microcnus gliriformis,* and perhaps *Mesocnus,* together with fossil bones of rodents and land turtles.

November, 1949: "Cueva José Brea," northern slope of Sierra de Pan de Azucar, Pinar del Río Province, dorsal vertebra of *Mesocnus* or *Megalocnus* and fossil remains of insectivores, land turtles, and crocodiles.

Beginning of 1953: "Abra de Andrés," near Esperón, Sierra de Anafe, Pinar del Río Province, mandible of *Megalocnus rodens* and skull of *Mesocnus.*

January, 1954: "Caverna de Pío Domingo," Sierra de Sumidero, Pinar del Río Province, several skeletons of edentates scattered in a gallery about 1 kilometer in extent. Fossil remains of about 10 individuals of *Microcnus gliriformis* were collected at this time, in addition to skeletal elements of *Megalocnus, Mesocnus,* insectivores, rodents, and running birds. In the "Cueva del Salón," Sierra de Quemado, in Quemado de Pineda, Pinar del Río Province, skeletal remains of *Megalocnus rodens* were found.

July, 1954: "Cueva de Paredones," San Antonio de los Baños, La Habana Province, cave of one gallery of about 80 meters, the floor of which was strewn with fossil remains of ground sloths (*Megalocnus, Mesocnus, Miocnus, Microcnus*), rodents, insectivores, land turtles, crocodiles, lizards, and birds, transported to the interior of the cave by rain water.

Acknowledgments

I want to thank Prof. Oscar Arredondo for his courtesy in sending me detailed information on the fossil material of his own collection and of the collection of the Sociedad Espeleológica de Cuba, and for excellent and numerous photographs as well as schematic drawings of the best specimens of those collections, some of which are reproduced here.

Thanks are also due to Prof. Antonio Nuñez Jimenez, founder of the Sociedad Espeleológica de Cuba, competent geographer and researcher, for the valuable collaboration represented by his books and articles, especially those on Cuban geography and speleology.

To Dr. David H. Johnson, Curator of the Division of Mammals of the United States National Museum of the Smithsonian Institution, I am grateful for additional information on some of the specimens collected by Gerrit S. Miller, Jr., and Arthur J. Poole in Haiti in 1925 and 1929.

Special thanks go to the Conselho de Pesquisas da Universidade do Brasil for a grant that permitted me to devote full time to paleontological research and assisted the preparation of the present paper.

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SYSTEMATICS

ORDER EDENTATA CUVIER, 1798

SUBORDER XENARTHRA COPE, 1889

INFRAORDER PILOSA FLOWER, 1883

SUPERFAMILY MEGATHERIOIDEA CABRERA, 1929

FAMILY MEGALONYCHIDAE ZITTEL, 1892

SUBFAMILY MEGALOCNINAE KRAGLIEVICH, 1923

MEGALOCNUS LEIDY, 1868

Megalocnus LEIDY, 1868, p. 180. DE LA TORRE, 1910a, 1910b. PAULA COUTO, 1956, p. 424. MATTHEW AND PAULA COUTO, 1959, p. 13.

Megalonyx (*Myomorphus*) POMEL, 1868a, p. 665; 1868b, p. 850. DE LA TORRE, 1910a, 1910b. PAULA COUTO, 1956, p. 424. MATTHEW AND PAULA COUTO, 1959, p. 13.

Megalochnus: AMEGHINO, 1881, p. 303 (invalid emendation or misspelling). PAULA COUTO, 1956, p. 424. MATTHEW AND PAULA COUTO, 1959, p. 13.

Megalonyx: LYDEKKER, 1887, p. 111 (including *"Megalochnus"* = *Myomorphus*) *nec* Harlan, 1825. PAULA COUTO, 1956, p. 424. MATTHEW AND PAULA COUTO, 1959, p. 13.

Megalonyx (*Megalochnus*): ZITTEL, 1894, p. 136. PAULA COUTO, 1956, p. 424. MATTHEW AND PAULA COUTO, 1959, p. 13.

Neomesocnus ARREDONDO, 1961, p. 21.

TYPE SPECIES: *Megalocnus rodens* Leidy, 1868.

DISTRIBUTION: Pleistocene. Cuba.

DIAGNOSIS: Teeth 5/4, first upper and lower pair enlarged and spaced as in *Megalonyx,* but approximated medially, flattened into a scalpriform type, broadly convex anteriorly, concave posteriorly; cheek teeth like those of *Megalonyx* but longer; palate greatly depressed in relation to basicranial axis, much as in the Glyptodontoidea.

Condyles much elevated above lower tooth row; anterior border of coronoid process between second and third molars.

Limb bones slender as in Santacruzean megatherioids. Humerus with large entepicondylar foramen. Manus as in Santacruzean megatherioids, but metacarpals less differentiated, and unguals long, slender, comparatively straight, and but little compressed.

DISCUSSION: The skull and mandible of *Megalocnus* resemble particularly those of the tree sloths of today and the glyptodonts in their general shape. They are more globose, in conjunction, than elongate. The zygomatic arch is widely open, the jugal bone being slender and reduced. The teeth are very like those of *Megalonyx,* but the front ones are more specialized, somewhat rodent-like. The neck is relatively elongated; the

body, somewhat heavy. The ilium is broad, but much less expanded anteroposteriorly than in *Megalonyx* and *Glossotherium,* for example, recalling that of *Nothrotherium* in this aspect. The tail is rather short. The limb and foot characters are much like those of the Miocene (Santacruzean) relatives (*Hapalops* and others), but with elongate ungual phalanges. They are very primitive and unspecialized. The morphology of the astragalus shows that the animal, like the anteaters (*Myrmecophaga*), had no tendency to walk upon the outer side of the pes, as was the case with the continental Pleistocene relatives. The pes, like the manus, was plantigrade. The skeleton in general is most like that of the Santacruzean megalonychids, somewhat more massive, although not nearly so much so as *Megalonyx.*

Megalocnus includes the largest and apparently most abundant Antillean species of the group, *Megalocnus rodens,* the size of which was about or a little larger than that of an American black bear (*Ursus americanus*). Its weight would have been about 600 pounds (270 kilograms) in the fully adult condition.

Among the species proposed for this genus, only one, *M. rodens* Leidy, 1868, type, seems to be surely valid. Even the subdivision of *M. rodens* into two subspecies, as proposed by Matthew, seems to be forced, as I said earlier (Matthew and Paula Couto, 1959, p. 28), and as was confirmed by Simpson (*in* Matthew and Paula Couto, 1959, p. 52).

Nevertheless, on the basis of present knowledge, I prefer to maintain here the taxonomic divisions I adopted earlier (Matthew and Paula Couto, 1959), until new and more complete collections give us better elements for the establishment of a definitive taxonomy for the group.

Megalocnus rodens Leidy, 1868

"Mamífero . . . roedor . . . antediluviana" Poey, 1861 (*fide* de Castro, 1864, p. 58). Matthew and Paula Couto, 1959, p. 24.

"Nuevo género . . . del orden de los edentes" de Castro, 1864, p. 96. Matthew and Paula Couto, 1959, p. 24.

Megalocnus rodens Leidy, 1868, p. 180. Matthew and Paula Couto, 1959, p. 24.

Myomorphus cubensis Pomel, 1868a, p. 665. Matthew and Paula Couto, 1959, p. 24.

Holotype: Greater part of a mandible with the left $M_{3\ 4}$ and right incisiform tooth (M_1) and $M_{2\ 3}$, presumably in the collections of the Madrid museum. Collected by José Figueroa, 1860. Figured in de Castro, 1864.

Localities: Ciego Montero, near Cienfuegos; Casimba, Sierra de Jatibonico, Cuba.

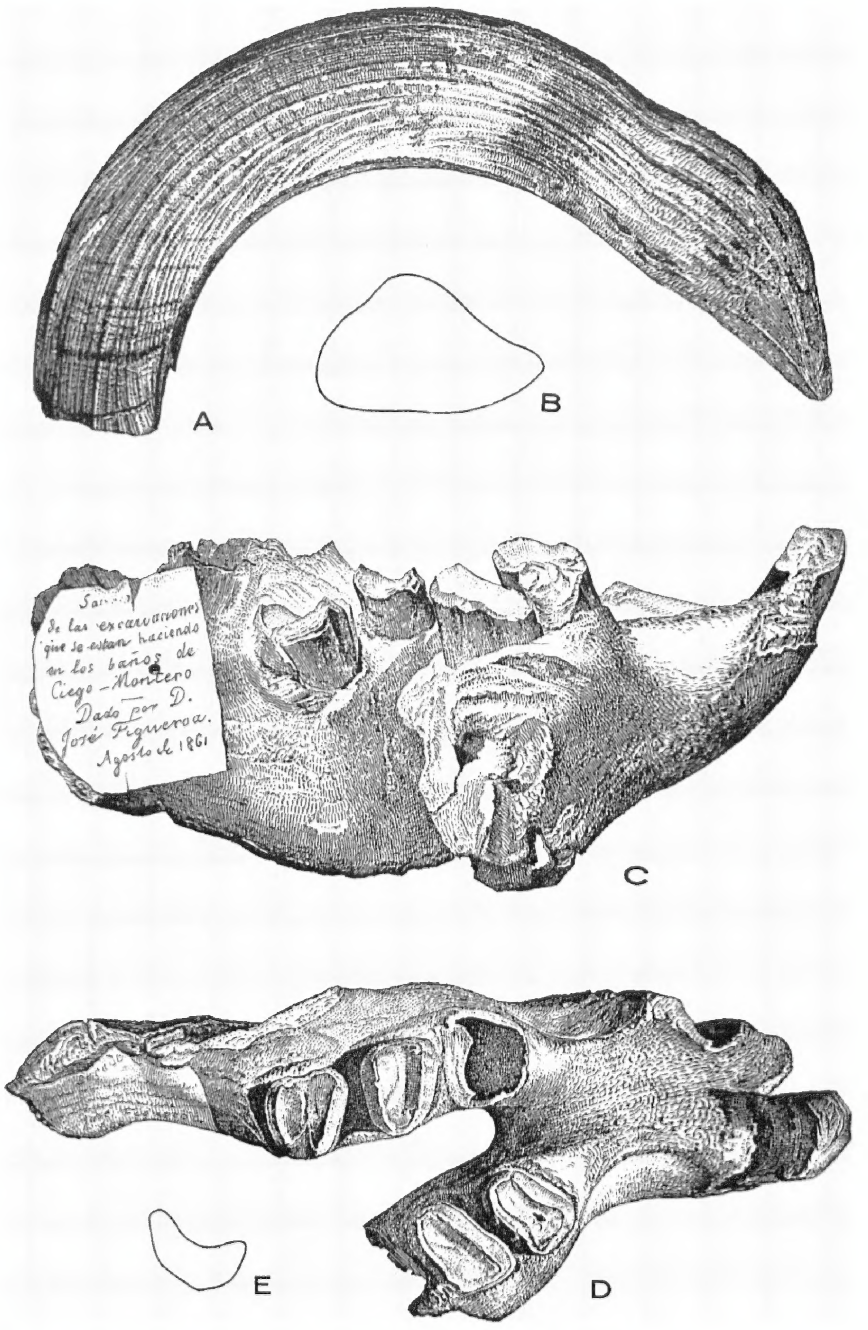

FIG. 2. Reproduction of de Castro's plate of the first registered discoveries of fossil mammals in Cuba. A, B. Left lower (?) canine of a peccary introduced by man, erroneously considered to be of a hippopotamus. A Side view. ×⅛. B. Cross section. ×½. C-E. Type mandible of *Megalocnus rodens rodens* Leidy, 1868; Ciego Montero, Cuba. C. Side view. ×½. D. Top view. ×½. E. Cross section of the right lower "caniniform" tooth (M_1).

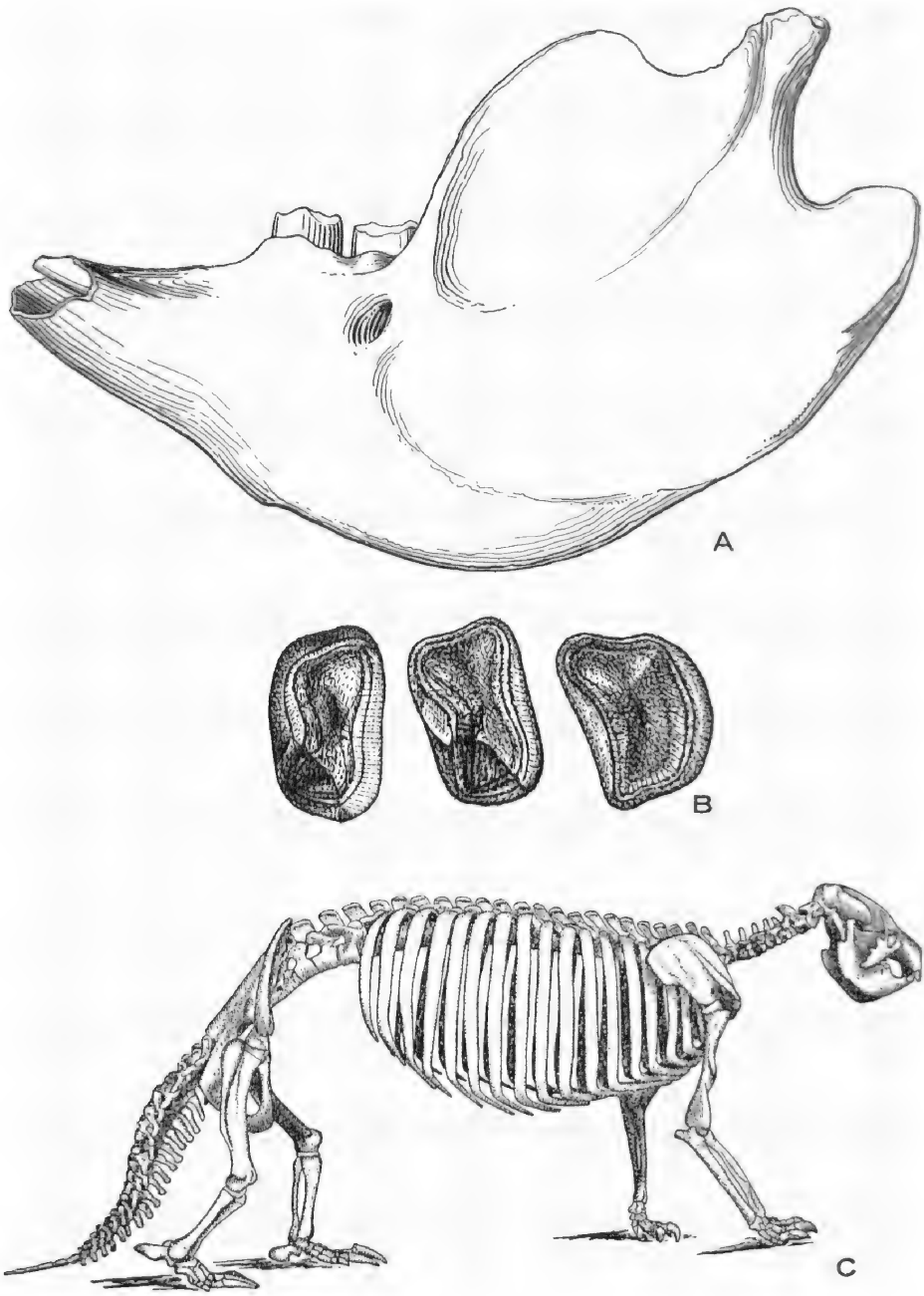

FIG. 3. *Megalocnus rodens rodens* Leidy, 1868; Ciego Montero, Cuba. A. A.M.-N.H. No. 49956, almost complete mandible with right and left $M_{2\ 4}$, left side view. ×½. B. M.N.R.J. No. 2012-V, right, $M_{2\ 4}$, top view, ×1. C. A.M.N.H. No. 16876, composite skeleton, right side view. *Ca.* ×1/17.

HYPODIGM: See Matthew and Paula Couto (1959, pp. 24–26).

DIAGNOSIS: The only surely valid species of the genus. Larger than the doubtful species *M. ursulus.*

Megalocnus rodens was certainly the most conspicuous element of the Pleistocene fauna of Cuba, and of the West Indies in general. Its ecological affinities must have been different from those of the larger representatives of the same group (Megatherioidea) in the Pleistocene of the continent, since it had to adapt itself to a relatively small number of rather static, closed ecological niches, as is the case with at least the insular species of mammals (Simpson, 1953, p. 306). It was perhaps preferentially an inhabitant of the humid dense tropical forests in the mountains and valleys or along the banks of streams.

Megalocnus rodens rodens Leidy, 1868

Figures 2, 3

Megalocnus rodens rodens LEIDY, 1868, *in* Matthew and Paula Couto, 1959, p. 26.

HOLOTYPE: The same as for the species.

LOCALITY: Ciego Montero, near Cienfuegos, Cuba.

HYPODIGM: The same as for the species except the material referred to *M. rodens casimbae.*

DIAGNOSIS: Incisiform teeth wider than in *M. rodens casimbae* and molars less like those of *M. ursulus.* Measurements were given in Matthew and Paula Couto, 1959 (tables 2–12).

Megalocnus rodens casimbae Matthew, 1959

Megalocnus rodens casimbae MATTHEW, 1959, *in* Matthew and Paula Couto, 1959, p. 27.

HOLOTYPE: A.M.N.H. No. 49987, almost complete mandible with the two last right molars (M_{3-4}) and the left incisiform tooth (M_1): Carlos de la Torre collection.

LOCALITY: Casimba, Sierra de Jatibonico, Cuba.

HYPODIGM: See Matthew and Paula Couto (1959, pp. 27, 28).

DIAGNOSIS: Incisiform teeth about two-thirds as wide as those of *M. rodens rodens;* M_{2-4} intermediate between those of this species and those of *M. ursulus.* Measurements were given in Matthew and Paula Couto (1959, tables 13–20).

Megalocnus ursulus Matthew, 1959

Megalocnus ursulus MATTHEW, 1959, *in* Matthew and Paula Couto, 1959, p. 30.
Megalocnus junius MATTHEW, 1959, *in* Matthew and Paula Couto, 1959, p. 30.
Neomesocnus brevirrostris ARREDONDO, 1961, p. 22.

HOLOTYPE: A.M.N.H. No. 49996, incomplete mandible, without teeth; Carlos de la Torre collection.

LOCALITY: Casimba, Sierra de Jatibonico, Cuba.

HYPODIGM: See Matthew and Paula Couto (1959, p. 30).

DIAGNOSIS: Size about two-thirds of that of *M. rodens.* Convexity of mandible beneath and behind last molar much less. Molar teeth less broad. M_3 possibly one-sixth wider than long. Measurements were given in Matthew and Paula Couto (1959, table 14).

It is possible that *M. ursulus* may prove to be the young of *M. rodens casimbae* from the same locality. Decision on this point depends on future field explorations in Cuba.

NEOMESOCNUS ARREDONDO, 1961

Neomesocnus ARREDONDO, 1961, p. 22.

TYPE SPECIES: *Neomesocnus brevirrostris* Arredondo, 1961.

DISTRIBUTION: Pleistocene. Cuba.

DIAGNOSIS: Difficult to establish, since the type and only species is founded on a small anterior mandibular fragment without teeth and with only the alveolus of M_1 preserved. It seems to be from a juvenile individual.

DISCUSSION: The mandibular fragment, holotype of the only known species, corresponds to the most anterior region of a right lower jaw, broken in the symphysis, with a small part of the symphyseal region of the left lower jaw present. Only the alveolus of the right caniniform or incisiform tooth (M_1) is preserved, the mandible being broken at the anterior part of the alveolus of M_2.

Judged from Arredondo's drawings, the mandibular symphysis is short, and the fragment under discussion is closely similar to the corresponding part of the mandible of *Megalocnus rodens,* not only because of the depth of the symphysis, but also by its morphology.

Arredondo wrote (a) that M_1 recalled more closely in form and size the homologous tooth of *Mesocnus* than that of *Megalocnus,* and pointed out the fact that M_1 was directed somewhat more externally than in *Megalocnus;* (b) that the mandible under consideration did not have a symphyseal tongue, which is also true for *Megalocnus;* (c) that M_2, judged by the small preserved part of the alveolus, must have been very like that of *Mesocnus browni,* though slightly larger.

The differences pointed out in (a) and (c), if true relative to the incisiform tooth (M_1), are doubtful concerning M_2, because all we know of this tooth is the anterior part of its alveolus. Even the difference indicated for M_1, of which the transverse section would be more similar to

that of the incisiform or caniniform tooth of *Mesocnus* than to that of *Megalocnus,* does not seem very significant, if we consider the hypothesis that the small mandibular fragment under consideration could well be from a juvenile individual of *Megalocnus,* as it appears to me.

In spite of my conviction that *Neomesocnus* represents merely a juvenile condition of *Megalocnus* and is in this case a synonym of Leidy's genus, I prefer to concede it the benefit of doubt until future discoveries of more complete material decide definitely its real systematic status.

Neomesocnus brevirrostris Arredondo, 1961

Neomesocnus brevirrostris (*sic*) ARREDONDO, 1961, p. 22.

HOLOTYPE: Arredondo collection No. 51, fragment of right lower jaw, broken at the anterior edge of the alveolus of M_2, and with the alveolus of M_1 preserved.

LOCALITY: Cueva de Paredones, Los Paredones, Término Municipal de Alquizar, La Habana Province, Cuba.

HYPODIGM: The type only.

DIAGNOSIS: As for the genus. Size a little larger than that of *Mesocnus browni.* Measurements were given by Arredondo (1961, pp. 21, 22).

SUBFAMILY ORTOTHERIINAE KRAGLIEVICH, 1923

MICROCNUS MATTHEW, 1919

Microcnus DE LA TORRE AND MATTHEW, 1915, p. 152 (*nomen nudum*). MATTHEW, 1919a, p. 168; 1919b, p. 660; 1931, p. 4. MATTHEW AND PAULA COUTO, 1959, p. 44.

Neocnus ARREDONDO, 1961, p. 29.

TYPE SPECIES: *Microcnus gliriformis* Matthew, 1931.

DISTRIBUTION: Pleistocene. Cuba.

DIAGNOSIS: Skull relatively short, evenly convex throughout its entire length, with frontal region immediately behind orbits, a little salient above convex upper surface of skull; rostrum medially elongated, abruptly narrowed before frontal region, low, laterally constricted in its inferior part between M^{1-2} and gently expanded in its anterior region laterally to alveolus of M^1 (caniniform tooth); nasals well developed, relatively wide; postorbital constriction very weak; temporal region wider than anterior part of skull, with strong posterior slope to low occipital region; long diastema between caniniform teeth (M^1) and M^2; alveolus of M^1 a little external to longitudinal axis of alveoli of M^{2-5}, roughly ellipsoidal in outline, and slightly turned out; alveoli of M^{2-5} contiguous, apparently round or roughly subcircular in outline; basioccipital region about in

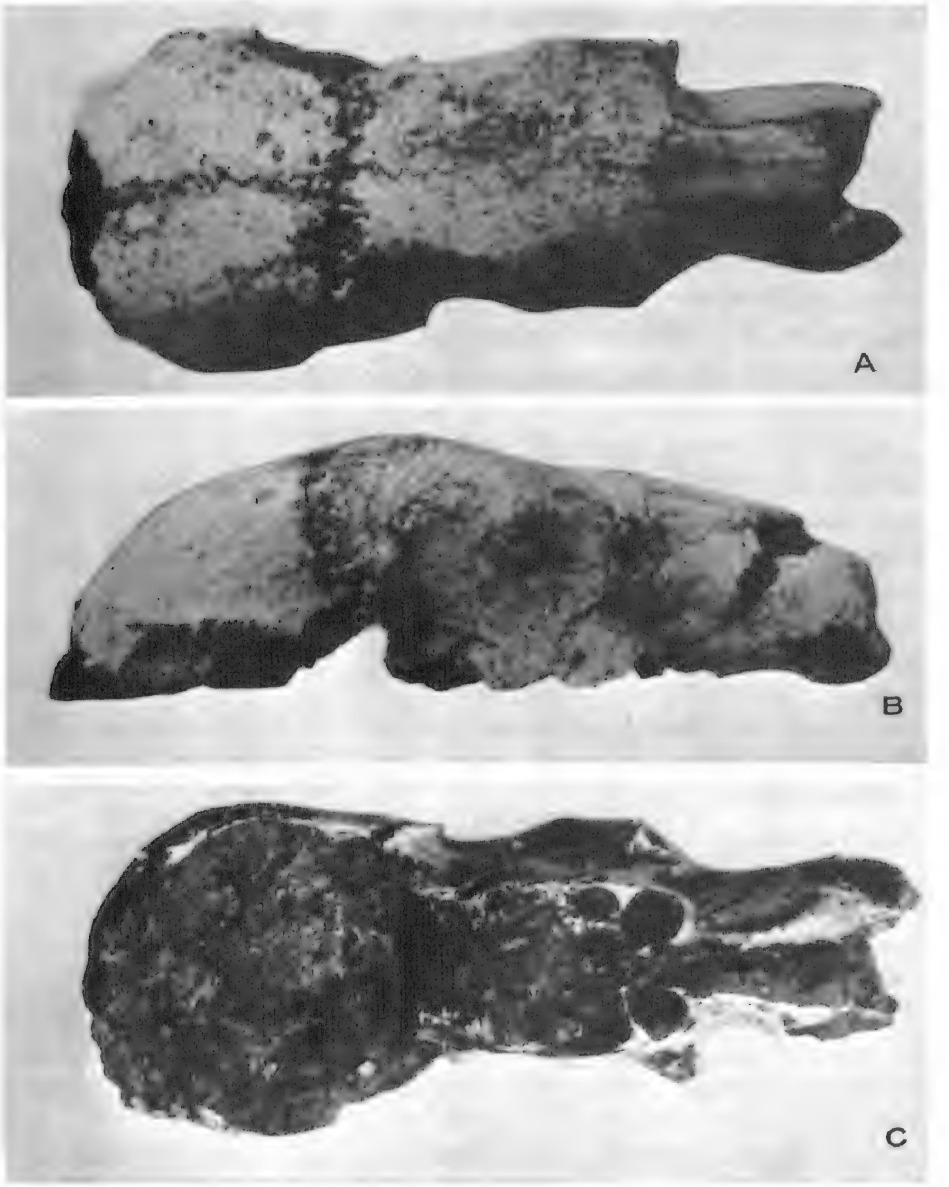

FIG. 4. *Microcnus gliriformis* Matthew, 1931, S.E.C. No. 481-d, incomplete skull; San Antonio de los Baños, Cuba. A. Top view. B. Right side view. C. Palatal view. Courtesy of Prof. Oscar Arredondo. About ×1.

same plane as palatal region; glenoid cavity low, little elevated above level of alveolar border. Mandibular symphysis and symphyseal tongue short; condyle little elevated above tooth row. Lower caniniform tooth

(M_1) grooved posterointernally. Lower molars subquadrate, grooved on inner and outer sides.

Microcnus gliriformis Matthew, 1931

Figures 4, 5

Microcnus gliriformis Matthew, 1931, p. 4. Matthew and Paula Couto, 1959, p. 44.

Neocnus major Arredondo, 1961, p. 32.

Neocnus minor Arredondo, 1961, p. 33.

Holotype: A.M.N.H. No. 16882, right ramus of mandible with two last molars and alveoli of the caniniform tooth (M_1) and of M_2; Carlos de la Torre collection.

Locality: Casimba, Sierra de Jatibonico, Cuba.

Hypodigm: The type and the material referred to by Matthew and Paula Couto (1959, p. 45); the holotypes of *Neocnus major* and *N. minor*, mandibular fragments, cited by Arredondo (1961); and S.E.C. No. 481-d, incomplete skull without teeth.

Diagnosis: Only species of the genus. Measurements were given in Matthew and Paula Couto (1959, table 35) and in Arredondo (1961, pp. 29–31, 34, 35).

Discussion: Arredondo wrote that the principal difference between his *Neocnus* and *Microcnus* is the presence of the symphyseal tongue in the mandible of the former.

The mandibular fragment, type of *Microcnus gliriformis*, the only species of the genus and its genotype, lacks the symphyseal region because of fracture. Matthew and Paula Couto (1959, p. 45) wrote, "the symphysis is quite short and wide, shaped as in *Megalocnus*, the symphyseal tongue being apparently absent."

There is therefore no reason to assume definitely that *Microcnus* lacked such a symphyseal tongue which could well be present in this genus, because it is, though short, in the type specimen of *Neocnus major* Arredondo, the genotype of *Neocnus*, a synonym of *Microcnus*.

Also the teeth of *Neocnus* are completely similar to those of *Microcnus*, as Arredondo himself recognized.

The differences in size pointed out by Arredondo (1961, p. 30) between the type mandible of *Neocnus major* and the type of *Microcnus gliriformis* are minimal and have no taxonomic significance by themselves. Arredondo himself (1961, p. 33) attributed to *Neocnus minor* (in my opinion a synonym of *N. major*) fossil remains of an individual just a little smaller than *N. major*, and of the same size as *Microcnus gliriformis*, a fact suggestive of the synonymy here established.

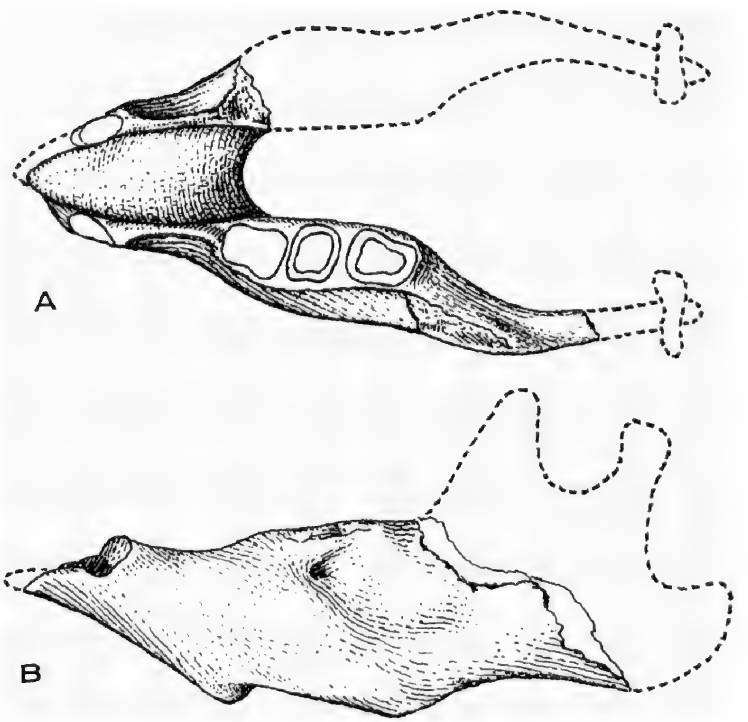

FIG. 5. *Microcnus gliriformis* Matthew, 1931, S.E.C. No. P-318, incomplete lower jaw; Pío Domingo, Sumidero, Pinar del Río, Cuba. A. Top view. B. Left side view. After Arrendodo's photographs. ×1.

MESOCNUS MATTHEW, 1919

Mesocnus DE LA TORRE AND MATTHEW, 1915, p. 152 (*nomen nudum*). MATTHEW, 1919a, p. 168; 1919b, p. 660; 1931, p. 2; 1959, *in* Matthew and Paula Couto, 1959, p. 31.

?Parocnus MILLER, 1929a, p. 28.

TYPE SPECIES: *Mesocnus browni* Matthew, 1931.

DISTRIBUTION: Pleistocene. Cuba; ?Haiti.

DIAGNOSIS: 5/4 M. Anterior teeth (M^1_1) of moderate size, upper pair oval in cross section, arched and obliquely set, as in *Megalonyx,* lower pair almost semicircular or roughly rounded-triangular in cross section, inner side deeply grooved. Symphysis with a rather long median tongue slightly decurved. Cheek teeth subquadrate, obliquely set, last lower teeth largest. Skull slender, more elongate anteriorly, with a marked constriction in front of cheek teeth. Humerus without entepicondylar foramen. Femur somewhat elongate, distally narrower, condyle well developed, neck short, great trochanter somewhat prominent, inwardly decurved;

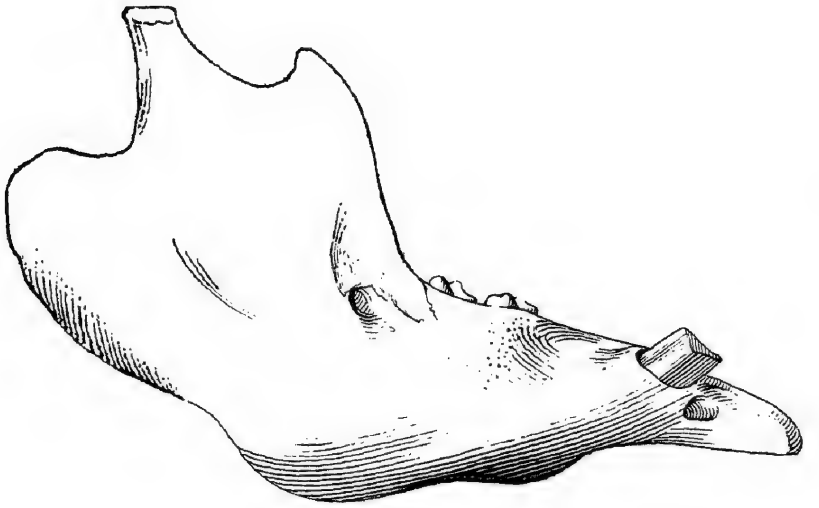

FIG. 6. *Mesocnus browni* Matthew, 1931, A.M.N.H. No. 16878, partial mandible, external side view (posterior part and "caniniform" tooth restored); Ciego Montero, Cuba. *Ca.* ×⅝.

lesser and third trochanters very weak, lamellar-elongated; diaphysis constricted laterally in middle of shaft.[1]

Mesocnus browni Matthew, 1931

Figures 6, 7A, 8A, 13A

Mesocnus browni MATTHEW, 1931, p. 2. MATTHEW AND PAULA COUTO, 1959, p. 31.

HOLOTYPE: A.M.N.H. No. 16877, anterior half of skull.

LOCALITY: Ciego Montero, Cuba; the American Museum of Natural History expedition of 1911.

HYPODIGM: See Matthew and Paula Couto (1959, pp. 31, 32, except A.M.N.H. No. 49919, femur).

DIAGNOSIS: A relatively robust species, about four-sevenths as large as *Megalocnus rodens rodens.* Last lower molar (M_4) with posterior and internal

[1] The part of the diagnosis regarding the femur was modified from Matthew and Paula Couto (1959, p. 31) in view of personal communication and pictures sent me from Cuba by Prof. Oscar Arredondo. One of these pictures shows an almost complete femur, among other skeletal remains of *Mesocnus,* including a mandible, all from one individual, found in a cave in Pío Domingo (see text). Therefore, the femur (A.M.N.H. No. 49919) which was doubtfully ascribed by me to *Mesocnus browni* (Matthew and Paula Couto, 1959, pp. 36, 37), and on which I based this part of the diagnosis (p. 31), does not belong in *Mesocnus.* It is probably from *Miocnus.*

faces about as long as opposite ones, and forming a rounded right angle. Mandible with conspicuous swelling under M_{3-4}. Measurements: See Matthew and Paula Couto (1959, tables 21–27).

Mesocnus torrei Matthew, 1931

Figures 7B, 8B, 9–12

Mesocnus torrei MATTHEW, 1931, p. 3. MATTHEW AND PAULA COUTO, 1959, p. 39.

HOLOTYPE: A.M.N.H. No. 16879, lower jaw, the symphysis and left ramus with all the teeth, but the condyle, angle, and coronoid process incomplete; C. de la Torre collection.

LOCALITY: Casimba, Sierra de Jatibonico, Cuba.

HYPODIGM: See Matthew and Paula Couto (1959, p. 39); also possibly S.E.C. No. P-266, almost complete skull, found in the Cueva de los Niños, Cayo Salinas, northeastern Caibarien, Las Villas Province, Cuba, by members of the Sociedad Espeleológica de Cuba, 1946; also an incomplete mandible, with imperfect left ramus and anterior part of right ramus without teeth, a right femur lacking distal end, and a complete right humerus, all belonging to an almost complete skeleton collected at the cave of Pío Domingo, Sierra de Sumidero, Pica-Pica Valley, Pinar del Río Province, west Cuba, in 1954, together with remains of *Megalocnus.*

The ascription of these specimens of *Mesocnus torrei* is due almost exclusively to their size which is comparable to that of the specimens from Casimba, Sierra de Jatibonico. Morphologically, *M. torrei* is virtually indistinguishable from *M. browni,* except for small details that are systematically insignificant.

DIAGNOSIS: A smaller and less robust species, molar teeth relatively smaller, and M_3 with posterior and internal faces merged into a single convex face.

DISCUSSION: It is possible that *M. torrei* is merely the immature stage or the female of *M. browni,* that is, a synonym of the type species. I think that the Cuban paleontologists are now able to resolve this doubt, in view of the excellent collections made lately in the caves of that country by the Sociedad Espeleológica de Cuba and other scientific societies.

DESCRIPTION: The skull, relatively elongate, low, and narrow, is very different from that of *Megalocnus.* It is more primitive in aspect and is nearest to skulls of the Miocene (Santacruzean) forms of the family. Its rostrum is tubuliform, laterally compressed, especially in front of the orbits, where an anteroposterior concavity is present. The rostrum is less elongate than in *Megalocnus* and *Acratocnus;* its depth in the distal end is less than a half of the depth in the orbital region.

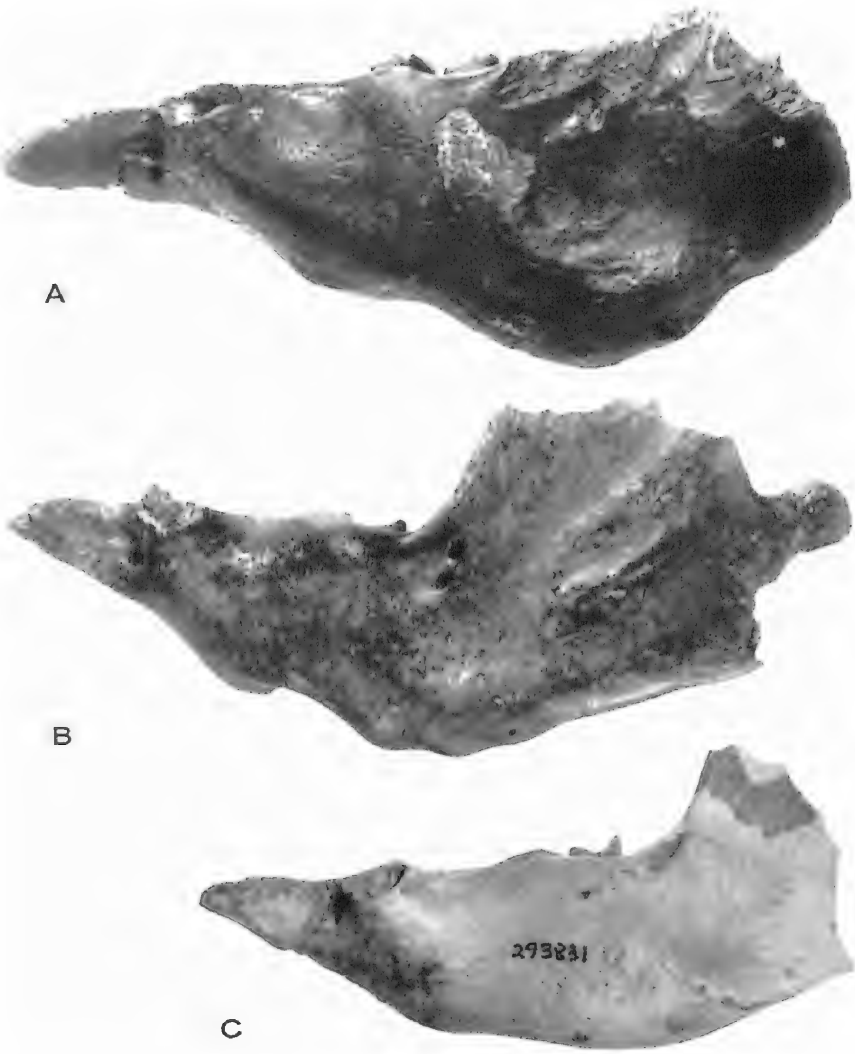

FIG. 7. Partial lower jaws, left side view. A. *Mesocnus browni* Matthew, 1931, A.M.N.H. No. 16878; Ciego Montero, Cuba. B. *Mesocnus torrei* Matthew, 1931, A.M.N.H. No. 16879, type; Casimba, Sierra de Jatibonico, Cuba. C. *Parocnus serus* Miller, 1929, U.S.N.M. No. 293831; cave near St. Michel, Haiti. All ×⅘.

In top view, the frontal region is roughly lozenge-shaped with a small postorbital constriction, behind which the skull becomes broader; its supraoccipital region is transversely straight, broad, meeting the squamosals at almost a right angle. The zygomatic processes of the squamosal are strong; their upper edge forms a continuous curve with the lambdoid crest and with the lateral edge of the bifid sagittal crest.

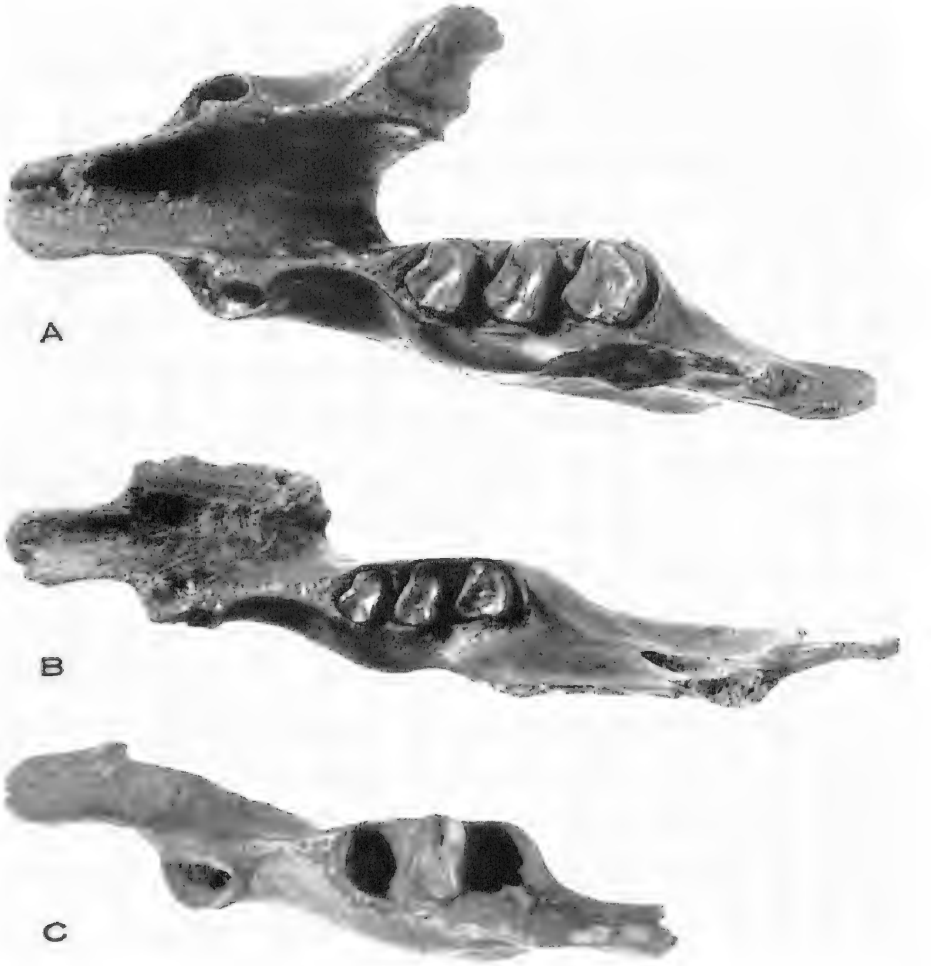

FIG. 8. Partial lower jaws, top view. A. *Mesocnus browni* Matthew, 1931, A.M.N.H. No. 16878; Ciego Montero, Cuba. B. *Mesocnus torrei* Matthew, 1931, A.M.N.H. No. 16879, type; Casimba, Sierra de Jatibonico, Cuba. C. *Parocnus serus* Miller, 1929, U.S.N.M. No. 293831; cave near St. Michel, Haiti. All ×⅝.

As in *Megalocnus,* the basifacial and basicranial axes of the skull are not in the same plane, the front of the skull being depressed relative to the cranium. As a result, the coronoid region of the mandible is very high. The approximate measurements in millimeters of the skull of *Mesocnus torrei* are as follows: length from anterior margin of maxillaries to posterior end of occipital condyles, 145; length from the mesial part of the edge of the intercondylar notch to the anterior end of the pala-

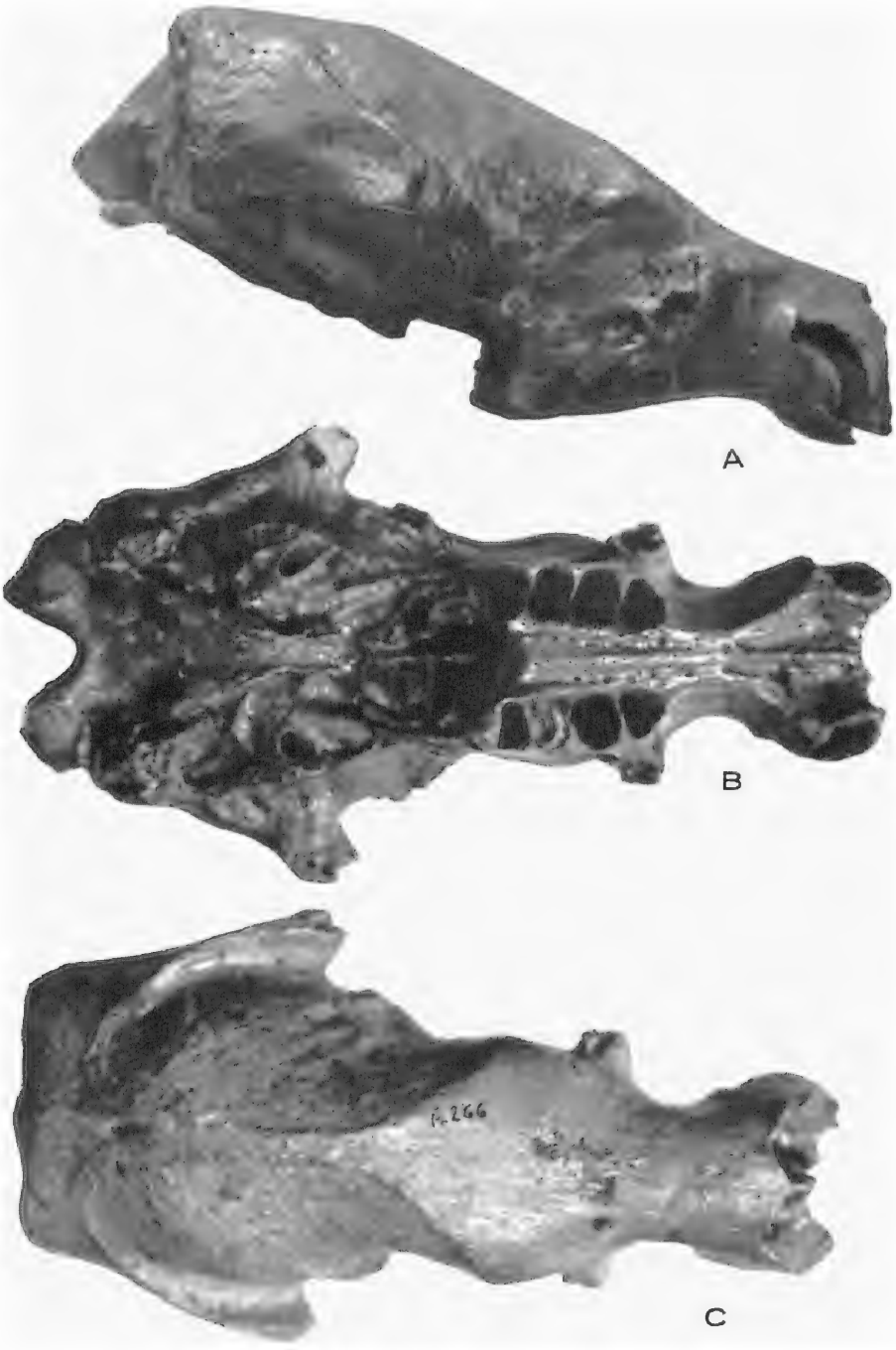

FIG. 9. *Mesocnus torrei* (?) Matthew, 1931, S.E.C. No. P-266, almost complete skull; Cueva de los Niños, Cayo Salinas, northeastern Caibarien, Las Villas Province, Cuba. A. Right side view. B. Palatal view. C. Top view. Photographs courtesy of Prof. Oscar Arredondo. *Ca.* ×¾.

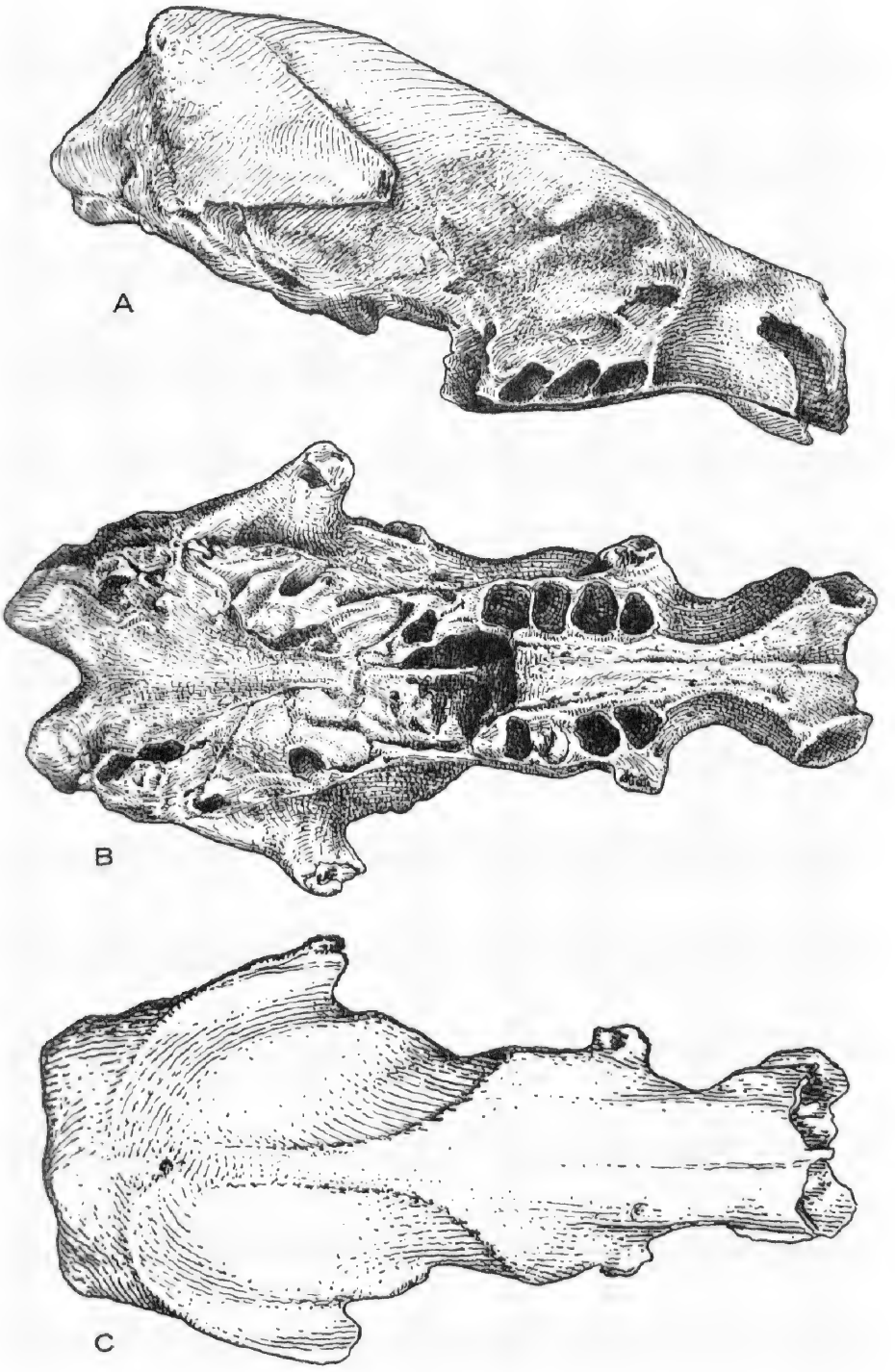

FIG. 10. *Mesocnus torrei* (?) Matthew, 1931, S.E.C. No. P-266. A. Right side view. B. Palatal view. C. Top view. From photographs. *Ca.* ×¾.

tine suture, 127; width between postfrontal processes, 40; bizygomatic width, 72; length of the M^{2-5} series, 30; diastema between M^{1-2}, 26; width between the external borders of the alveoli of M^1, 34.

The mandible is relatively strong and somewhat massive. It suggests by its general aspect the mandible of the Megatheriidae, though resembling more that of the Santacruzean members of its family without being particularly close to any of them.

The coronoid region is very elevated above the dental row, meeting the horizontal ramus of the mandible at almost a right angle (approximately 95°). It is very thin but wider anteroposteriorly; the condyle is somewhat higher than the coronoid process, from which it is separated by an anteroposterior concavity; it is strong and transversely subellipsoid. The angular region is still unknown. The approximate measurements (in millimeters) of the mandible of *Mesocnus torrei* are as follows: length from the posterior end of condyle to anterior end of symphysis, 137; width between symphysis and external border of alveolus of M_1, 12; length of symphyseal tongue anterior to M_1, 12; diastema between M_{1-2}, 23; length of M_{2-4} series, 30.

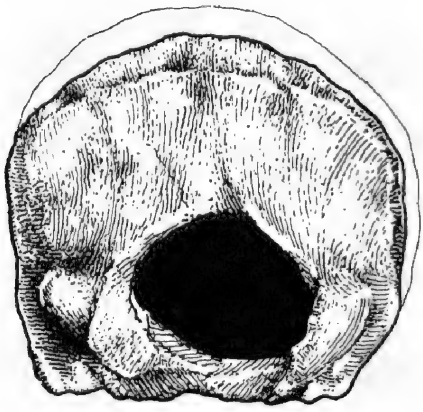

FIG. 11. *Mesocnus torrei* (?) Matthew, 1931, S.E.C. No. P-266, same skull as is shown in figure 10, occipital view. From a photograph. *Ca.* ×1.

The femur is elongate and relatively slender. Its proximal part is the widest, the bone becoming narrower at the middle of the shaft; the distal end was apparently not so wide as the proximal. The articular head is strong, semispherical, salient, the neck being short. The greater trochanter is somewhat decurved internally, the respective pit being apparently shallow. The lesser trochanter seems to have been little developed, bearing the aspect of an elongate crest. The third trochanter is rather salient relative to the width of the proximal half of the bone, and is anteroposteriorly flattened and somewhat elongated longitudinally; its upper edge is a prolongation of the latero-external edge of the diaphysis.

FIG. 12. *Mesocnus torrei* (?) Matthew, 1931, all one individual, in the Sociedad Espeleológica de Cuba; cave of Pio Domingo, Sierra de Sumidero, Pinar del Río, Cuba. A. Incomplete right femur, anterior view. *Ca.* ×⅝. B. Right humerus, almost complete, posterior view. *Ca.* ×⅝. C. Partial lower jaw, left side view. *Ca.* ×⅘.

A weak crest descends from the proximities of the great trochanter to the infero-internal side of the basis of the third trochanter, on the anterior face of the bone. The diaphysis becomes abruptly constricted transversely under the third trochanter, turning to be wider distally, though less wide than in its proximal end. The approximate measurements (in millimeters) of the femur of *Mesocnus torrei* are as follows: width of the proximal end, 48; width of the shaft at the third trochanter, 28; width of the head, 22.

The above descriptions and measurements of the skull, mandible, and femur are based on pictures of specimens recently discovered in Cuba as well as personal communication from Prof. Oscar Arredondo. For additional description, see Matthew and Paula Couto, (1959, pp. 32–39; the femur, A.M.N.H. No. 49919, does not belong to *Mesocnus;* it is probably from *Miocnus*).

PAROCNUS MILLER, 1929

Parocnus MILLER, 1929a, p. 28.

Megalocnus (part): PAULA COUTO, 1955, *in* Hoffstetter, 1955, p. 101; 1956, p. 424, *nec* Leidy, 1868; 1959, *in* Matthew and Paula Couto, 1959, pp. 12, 48.

Mesocnus (part): PAULA COUTO, 1959, *in* Matthew and Paula Couto, 1959, p. 31, *nec* Matthew, 1919.

TYPE SPECIES: *Parocnus serus* Miller, 1929.

DISTRIBUTION: Pleistocene. Haiti.

DIAGNOSIS: Close to *Mesocnus* but inferior border of mandible only slightly convex, almost parallel to alveolar border. Humerus as in *Mesocnus* but relatively stronger, with deltoid process a little more displaced to distal end. Femur as in *Mesocnus,* but apparently stronger and less elongated.

Parocnus serus Miller, 1929

Figures 7C, 8C, 13B

Parocnus serus MILLER, 1929a, p. 29.

Megalocnus serus (Miller): HOFFSTETTER, 1955, p. 102.

HOLOTYPE: U.S.N.M. No. 253228, right femur of immature individual, without epiphyses.

LOCALITY: Large cave near St. Michel, Haiti; collected by Arthur J. Poole, January, 1928.

HYPODIGM: Type femur and U.S.N.M. No. 253321, right humerus; U.S.N.M. No. 253230, proximal third of a left tibia; No. 253229, right astragalus; ?No. 253226, left calcaneum and two right calcanea. The association of all these specimens in this hypodigm, together with the type, was made with some doubt by Miller (1929a, pp. 28, 29). I add to

them U.S.N.M. No. 293831, an incomplete mandibular ramus with M_3 preserved, which was classified by Miller in the same collection as *Acratocnus comes* but which cannot be absolutely ascribed to *Acratocnus.*

The type femur, although from an immature individual, is morphologically similar to that from Pinar del Río, Cuba, which I ascribe to *Mesocnus torrei,* but is slightly larger and apparently more robust.

DIAGNOSIS: Only known species of the genus. Size about like that of *Mesocnus browni.*

DISCUSSION: *Parocnus* is very similar to *Mesocnus* in all the known parts. It was described by Miller before a full description of *Mesocnus* was published. In fact, it is quite possible that Miller would have ascribed the material on which the type species was based to a new species of *Mesocnus.* The Haitian species is, nevertheless, undoubtedly valid and quite distinct from the Cuban ones in general, including those of *Mesocnus.* Its ascription to a separate genus (*Parocnus*) may be valid, though, on the basis of present knowledge, its classification in *Mesocnus* could be well received.

The left lower jaw (U.S.N.M. No. 293831) lacks the angular and the coronoid regions. Its M_3 is the only tooth preserved. The alveoli of M_1 (caniniform tooth), M_2, and M_4 are in good condition.

The symphysis is ossified. Only a small part of the right lower jaw is preserved in the symphyseal region.

The only marked difference between this mandible and mandibles of *Mesocnus browni* and *M. torrei* is the absence of the conspicuous convexity or swelling under the last molar in the lower border of the mandible.

Judged by its alveolus, the first lower tooth (M_1) seems to have been more similar to that of *Acratocnus,* in cross section, than to that of *Mesocnus.* M_3, however, differs from that of *M. browni* only in its outline which is somewhat more quadrangular as a result of a greater anteroposterior prolongation of the lingual face. The alveoli of M_2 and M_4 indicate that the respective teeth were probably like those of *M. browni* in cross section. The proportions of the teeth, relative to the mandible, indicate greater affinities to *M. browni* also.

The right humerus (U.S.N.M. No. 253231), belonging to an adult individual, is, by its general morphology, almost indistinguishable from that of *Mesocnus browni.* It is of about the same size as the humerus, M.P.U.H. No. 1652, ascribed to this species, but it is relatively stronger, since the transverse measurements, in comparison with its total length, are proportionally larger. The supinator crest is well developed, a little more expanded externally than in *M. browni* and *M. torrei.* The deltoid process, broken in its external half, is more dislocated in the direction

FIG. 13. Right humeri, anterior view. A. *Mesocnus browni* Matthew, 1931, M.P.U.H. No. 1652; Ciego Montero, Cuba. B. *Parocnus serus* Miller, 1929, U.S.N.M. No. 253321; cave near St. Michel, Haiti. Both ×¾.

of the distal end of the bone than in the Cuban species under consideration. The entepicondyle is somewhat different, elliptical in outline, and

separated from the ulnar facet on the posterior face of the bone by a wide and well-excavated sulcus which communicates widely with the olecranon fossa (in *M. browni* it is subovate in outline, elongated, ending proximally in transverse edge, slightly directed forward, and is partially separated from the ulnar facet by a similar sulcus which does not reach the olecranon fossa).

TABLE 1

MEASUREMENTS (IN MILLIMETERS) OF A HUMERUS OF *Parocnus serus* AND ONE OF *Mesocnus browni*

	U.S.N.M. No. 253231, *Parocnus serus*	A.M.N.H. No. 49918, *Mesocnus browni*
Total length	210.2	219
Anteroposterior diameter of head	34	39
Transverse diameter of head	33.8	41.5
Anteroposterior length of proximal end	43	48
Width of proximal end	60	64.5
Width of diaphysis	40[a]	40
Width of distal end	75	75
Lower width of trochlea on posterior face of bone	50	51.5
Depth of trochlea	22	24
Length of greater trochanter	32	35.8
Width of bicipital groove	18	18.5

[a] Approximate.

A diaphysis of a right humerus (U.S.N.M. No. 293832) is of suitable morphology and proportions to be ascribed to an immature individual of this same species.

The diaphysis of the right femur, the holotype of this species, is very like that of a femur of *Mesocnus browni* collected, together with other bones of an almost complete skeleton, in Pío Domingo, Pinar del Río, Cuba, judged by a picture sent me by Prof. Oscar Arredondo.

As is the case with the humerus that Miller (1929a, pl. 9) associated with this femur, it is proportionally only a little more developed transversely than that of the Cuban species, which is in general slightly more slender.

The diaphysis in question, from the figure published by Miller (1929a, pl. 7), is 145 mm. long; its width is 55 mm. at the proximal end, 50 mm. at the distal end, and 33 mm. at the middle of the shaft.

A proximal fragment of a left tibia (U.S.N.M. No. 253230) was also

attributed to this species by Miller (1929a, pl. 8). The left side of it is well preserved; the right is somewhat fractured.

This fragment is closely similar to the corresponding part of a right tibia (A.M.N.H. No. 49921) from Ciego Montero, Cuba, ascribed to *Mesocnus browni* (Matthew and Paula Couto, 1959, pl. 34), which is slightly larger. Its width is about 50 mm.

A right fibula (U.S.N.M. No. 293834), a little smaller than A.M.N.H. No. 49925, belonging to *Mesocnus browni,* is of about the same proportions as this last-cited specimen. Except for slight morphological differences, which could well be considered the result of individual variations, if one were dealing with animals of a same species, this tibia offers nothing of

TABLE 2

COMPARATIVE MEASUREMENTS (IN MILLIMETERS) OF THE FIBULAE OF *Parocnus serus, Mesocnus browni,* AND *Acratocnus odontrigonus*

	U.S.N.M. No. 293834, *Parocnus serus*	A.M.N.H. No. 49925, *Mesocnus browni*	A.M.N.H. No. 17176, *Acratocnus odontrigonus*
Total length	134	145	131.5
Width of head	29.5	27.5	21
Width of external malleolus	17.5	21	15
Width of shaft	7	7.7	8

particular interest taxonomically in comparison with that of *M. browni.* The comparison with the largest fibulae of *Acratocnus odontrigonus* reveals that the fibula under consideration is much larger. The fibula of *Acratocnus* is proportionally much more slender and somewhat arched, whereas the fibula in question is like that of *M. browni,* stronger and straight, with a plane instead of convex internal border.

Miller (1929a, p. 28, pl. 10) ascribed to this species (with doubt) a right astragalus and three calcanea, in the United States National Museum.

The right astragalus bears the general aspect of that of *Megalocnus rodens,* but is somewhat smaller. It differs considerably, mostly in its upper articular surface for the tibia, from astragali ascribed to *Mesocnus browni* and *M. torrei* by Matthew and Paula Couto, 1959. Its neck, however, is shorter than in *Megalocnus rodens, Acratocnus odontrigonus,* and *Miocnus antillensis.* The navicular facet is plane on its anterior part instead of being deeply concave as in *M. rodens, A. odontrigonus,* and *M. antillensis,* or only slightly concave, as in *Mesocnus.* Also, it is directed forward and

situated at the anterior end of the longitudinal axis of the bone with which it forms a right angle. In *Megalocnus* and *Acratocnus,* only the external end coincides with the anterior end of the longitudinal axis of the bone, forming an angle of about 80 to 85 degrees. As a result of the shortening of the neck of the lesser internal projections, the astragalus is relatively much narrower in its anterior end than the astragali of *Megalocnus* and *Acratocnus* and thus seems to be more elongate. Its tibial face is roughly reniform, with a narrower posterior end.

The external face of the astragalus, including the articular facet for the fibula, resembles that of *Megalocnus.* It bears the deep fossa of muscular insertion roughly quadrangular in outline (present also in *Megalocnus*), on its postero-inferior part, immediately behind the fibular facet and above the ectal facet for the calcaneus.

But, in contrast to what is seen in *Megalocnus,* the external face of the astragalus, which is vertical and meets the upper face at a right angle, as in that genus, is deeper on its anterior part as a consequence of the slightly greater anterior depth of the external trochlea for the tibia.

The fibular facet is a roughly subtriangular isosceles figure in outline, its base being contiguous with the external trochlea and bearing a posterior elongate prolongation which passes above the cited fossa of muscular attachment. Its apex is contiguous with the ectal facet, a condition that is repeated with variations in *Megalocnus* and *Mesocnus* and is very distinctive from that observed in *Acratocnus,* a genus in which the external surface of the astragalus is deeply concave and rounded throughout its length.

Seen from the inferior (calcaneal) surface of articulation, this astragalus is very similar to that of *Megalocnus* and that of *Mesocnus* and very different from that of *Acratocnus.* Its ectal facet is elongate and anteroposteriorly concave, with parallel borders and rounded ends, situated on the external border of the inferior face of the bone under the external half of the upper face of the same. (In *Acratocnus,* the deep concavity of the external face pushed the ectal facet inward, so as to put it under the internal part of the upper face of the bone, exactly in the place usually occupied by the sulcus talis which, in the astragalus under consideration, as well as in that of *Megalocnus* and that of *Mesocnus,* separates the ectal facet from the sustentacular facet.) The sustentacular facet is identical to that of *Megalocnus* and that of *Mesocnus;* it is short, slightly convex anteroposteriorly, and contiguous with and almost perpendicular to the cuboidal facet. The cuboid facet is transversely convex and is, in turn, contiguous with the navicular facet, as in *Megalocnus* and *Mesocnus.*

In the upper face of the bone, the trochleae principally resemble those

of *Megalocnus,* but the trochlear borders are almost parallel to each other, with a much smaller anterior divergence than in this Cuban genus. Also, the external trochlea is much less bent downward posteriorly and is relatively shorter, with the external edge higher than in *Megalocnus.* The internal trochlea is short, as in *Megalocnus,* but relatively narrower than in this genus and lower than the external one. A wide, longitudinal, transversely convex groove, situated at the mesial and anterior part of the tibial face of the bone, separates the two trochleae from each other, as in *Megalocnus.* The tibial face of the astragalus is, therefore, different from that of *Mesocnus,* the internal articular trochlea of which tends to form a high, odontoid process, directed inward and upward. The outer trochlea is low, semicircular around the odontoid process, and almost flat or gently convex on its dorsal or articular surface, suggesting the condition found in the astragali of the Megatheriidae and Mylodontidae. The measurements (in millimeters) of the astragalus of *?Parocnus serus* are as follows: length, 43.1; width, 32; width of neck, 27.9.

The left calcaneum (U.S.N.M. No. 253226) is nearly equivalent in size to the right calcaneum (A.M.N.H. No. 49947) ascribed to *Miocnus antillensis.* It is relatively thicker than and distinctly different from calcanea of *Acratocnus.* Its general morphology suggests that of the calcanea of *Megatherium* and *Eremotherium,* in spite of its much smaller size. Compared with those of *Acratocnus* and *Miocnus,* its more notable difference lies in the tuber calcis which is compact, stronger, thicker, and much more laterally expanded. It is also notably different in its posterior outline, rounded and deep instead of plane, posteriorly oblique, and internally flattened. Its ectal facet for the astragalus is more elongate anteriorly than in *Acratocnus,* and its two halves (anterior and posterior) meet each other in an obtuse angle less open than in *Acratocnus.*

The anterior part of the calcaneum is about as wide as in *Miocnus.* Its cuboid facet is transversely elongate and concave, much more elongate to the external side than in *Acratocnus,* instead of being nearly rounded in outline and doubly concave as in this last-mentioned genus, or subtriangular and doubly concave. The internal (sustentacular) facet for the astragalus, which is lacking owing to a fracture, seems to have been much larger than in *Acratocnus* (in which genus it bears the form of an S and is frequently divided into two parts, internal and external, and of relatively variable sizes, by a short, longitudinal, and more or less marked groove). It is also different in morphology and extension from that of *Miocnus* (in which it is transversely elongate and concave, roughly pear-like in outline, and continuous with its narrower part directed outward, at least on the only known specimen, A.M.N.H. No. 49947). A deep

vascular pit (apparently absent from *Acratocnus*) is present in the anterior end of the tendinal groove between the two articular facets for the astragalus. Measurements (in millimeters) of the calcaneum of *?Parocnus serus* (U.S.N.M. No. 253226) are as follows: length, 55; width of tuber calcis, 29.2; length of tuber calcis, 15.2; width of the calcaneum, 29.2; depth of the calcaneum, 20.

ACRATOCNUS ANTHONY, 1916

Acratocnus ANTHONY, 1916, p. 195. WINGE, 1923, p. 313. MILLER, 1929a, p. 26, *nec* Anthony. HOFFSTETTER, 1955, pp. 101–102, *nec* Anthony.

Miocnus: PAULA COUTO, 1959, *in* Matthew and Paula Couto, 1959, p. 40, *nec* Matthew, 1919.

TYPE SPECIES: *Acratocnus odontrigonus* Anthony, 1916.

DISTRIBUTION: Pleistocene. Puerto Rico.

DIAGNOSIS: Teeth 5/4. Upper caniniform molar (M^1) trigonal in cross section, strongly curved, pointed vertically down, and lower caniniform molar (M_1) strong and straight, somewhat procumbent, external face plane, internal face convex, obliquely worn anteriorly. M^{2-5}_{2-4} all similar, roughly subelliptical in cross section, obliquely set, anterior and posterior edges somewhat elevated, intermediate surface anteroposteriorly concave. Skull relatively elongate, resembling in general aspects the Miocene forms (*Hapalops* and others), as does the mandible, but bearing strong sagittal and lambdoidal crests; strong lateral postorbital constriction; rostrum short; occipital condyles considerably projected posteriorly. Mandible strong and relatively short; inferior border slightly convex or approximately straight and more or less parallel to alveolar border; angular process strong, well projected posteriorly, wide, with its upper edge slightly below alveolar border; condylar region very wide anteroposteriorly, coronoid process and condyle low, condyle strong, transverse, raised slightly above dental level; symphyseal tongue short, with antero-inferior face plane and naturally continuous with rest of lower border of symphysis. Humerus like that of *Miocnus,* but deltoid crest relatively more expanded internally and externally, and epicondyle thinner but notably more elongate, conspicuously projected to internal side; distal articular end slightly inclined outward, particularly radial trochlea. Supinator crest widely developed. Femur resembling particularly that of *Miocnus* but much more elongate, less curved outward, lesser trochanter strong, much smaller than in *Miocnus;* articular head relatively much larger than in *Miocnus.*

Acratocnus odontrigonus Anthony, 1926

Figures 14–20, 23A, 24A

Acratocnus odontrigonus ANTHONY, 1926, p. 155.

Acratocnus major ANTHONY, 1926, p. 159.

HOLOTYPE: A.M.N.H. No. 14170, anterior portion of a skull extending to interorbital region above and to alveolus of M^2 below; right caniniform tooth (M^1) preserved; three fragments of mandibular rami associated with skull.

LOCALITY: Cueva de la Ceiba, Hacienda Jobo, near Utuado, Puerto Rico.

DISTRIBUTION: Pleistocene or sub-Recent, Puerto Rico.

HYPODIGM: The type and the additional material cited by Anthony

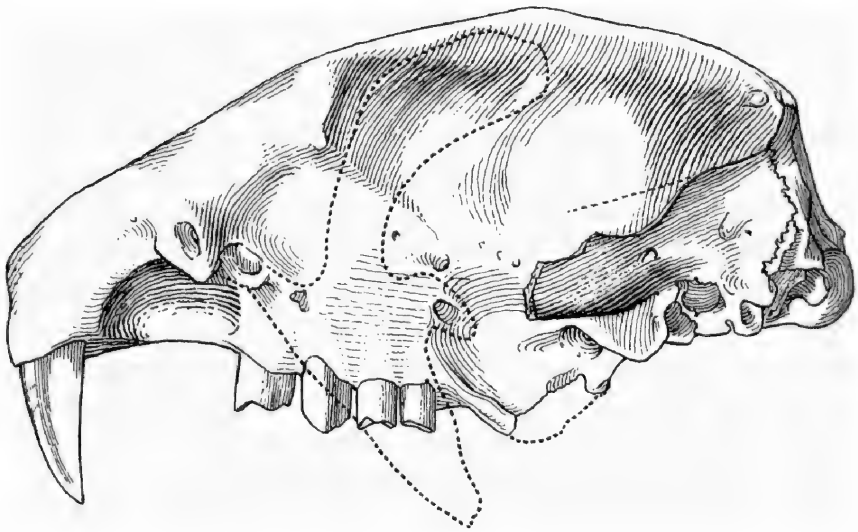

FIG. 14. *Acratocnus odontrigonus* Anthony, 1926, A.M.N.H. No. 17720, almost complete skull, left side view; Cueva de la Ceiba, near Utuado, Puerto Rico. Redrawn from Anthony. ×¾.

(1926, pp. 155–158) and the type material of *A. major* Anthony, 1926 (A.M.N.H. No. 17169; Anthony, 1926, p. 159).

DIAGNOSIS: Small size, about like that of *Miocnus*. Measurements were given by Anthony (1926).

DISCUSSION: This species is represented in the American Museum of Natural History by a large osteological collection from Puerto Rico.

The material on which Anthony founded the species *A. major,* collected in the same region (Utuado) as the type of *A. odontrigonus* but from a different locality (cave of the property of Don Gervacio Toraño, near Utuado, Puerto Rico), comes from an individual stronger and larger than the material ascribed to *A. odontrigonus,* although otherwise it differs very little.

The individual represented by these remains undoubtedly died at a

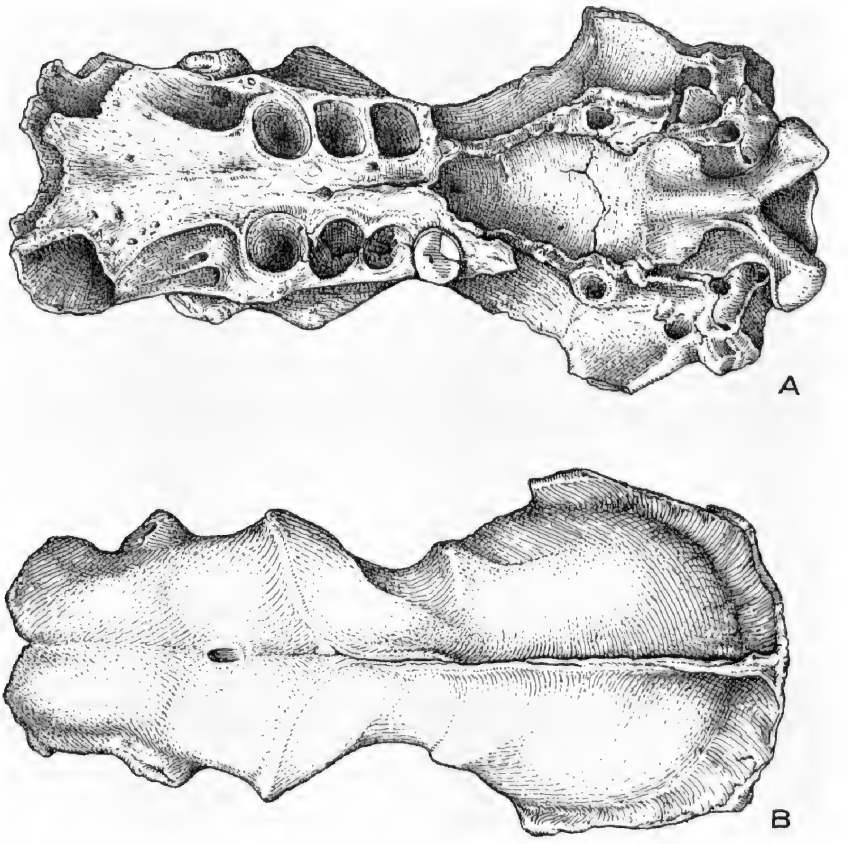

FIG. 15. *Acratocnus odontrigonus* Anthony, 1926, A.M.N.H. No. 17158, incomplete skull; Cueva de la Ceiba, near Utuado, Puerto Rico. A. Palatal view. B. Top view. Redrawn from Anthony. ×¾.

very old age, as is shown by the complete fusion of the several elements of the skull, with the complete obliteration of the respective sutures.

In my opinion, the slight morphological differences pointed out by Anthony, relative to *A. odontrigonus,* are individual and insufficient for specific separation, chiefly because morphological variations resulting from individual differences, sexual dimorphism, age differences, and so on, occurred frequently among the Edentata.

SYNOCNUS, NEW GENUS

TYPE SPECIES: *Acractocnus* (?) *comes* Miller, 1929.

DISTRIBUTION: Pleistocene or sub-Recent. Haiti.

DIAGNOSIS: Skull very different from that of *Acratocnus* with parallel lateral walls in the postorbital region without lateral constriction; sagittal

crest and postorbital process little salient. Mandible strong, massive, much wider and stronger than in *Acratocnus* and *Miocnus,* procumbent symphyseal tongue with plane antero-inferior face meeting lower border of mandible at angle of about 155 degrees; lower border straight under molars; alveolus of M_1 separated from edge of symphysis by a diastema considerably larger than in *Miocnus* and directed obliquely outward and forward; lateral constriction behind M_1 much less accentuated than in *Miocnus* and

FIG. 16. *Acratocnus odontrigonus* Anthony, 1926, A.M.N.H. No. 17715, almost complete skull, left side view; Cueva de la Ceiba, near Utuado, Puerto Rico. *Ca.* ×¾.

Acratocnus; diastema of M_{1-2} much larger than in *Miocnus* and *Acratocnus;* alveoli of M_{2-4} somewhat obliquely set. M_1 (caniniform molars) very strong, roughly triangular-rounded in outline. Femur similar to that of *Acratocnus* but intertrochanteric ridge with large and conspicuous tubercle in middle of shaft and slightly below lesser trochanter; neck of femur shorter than in *Acratocnus* and less bent outward and forward.

Synocnus comes (Miller, 1929), new combination

Figures 21, 23B, 24B

Acratocnus (?) *comes* MILLER, 1929a, p. 26.

HOLOTYPE: U.S.N.M. No. 253178, right femur, lacking distal end; collector, Gerrit S. Miller, Jr., March, 1925.

LOCALITY: Large cave, plantation of Atalaya, near St. Michel, Haiti.

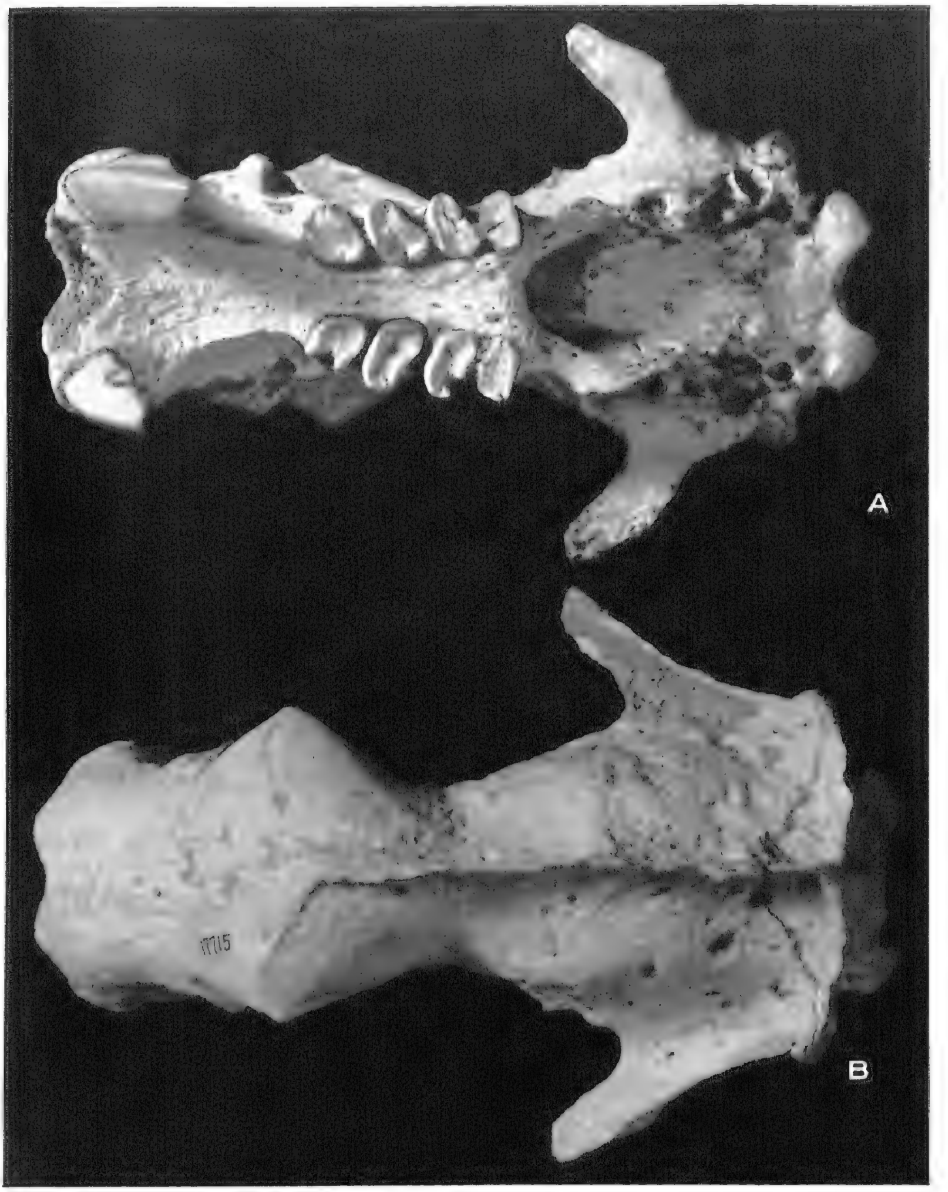

FIG. 17. *Acratocnus odontrigonus* Anthony, 1926, A.M.N.H. No. 17715, almost complete skull; Cueva de la Ceiba, near Utuado, Puerto Rico. A. Palatal view. B. Top view. *Ca.* ×¾.

HYPODIGM: The type and U.S.N.M. No. 293837, fragment of upper part of skull; No. 293836, anterior fragment of mandible with alveoli, as well as the additional specimens referred to by Miller (1929a). Also

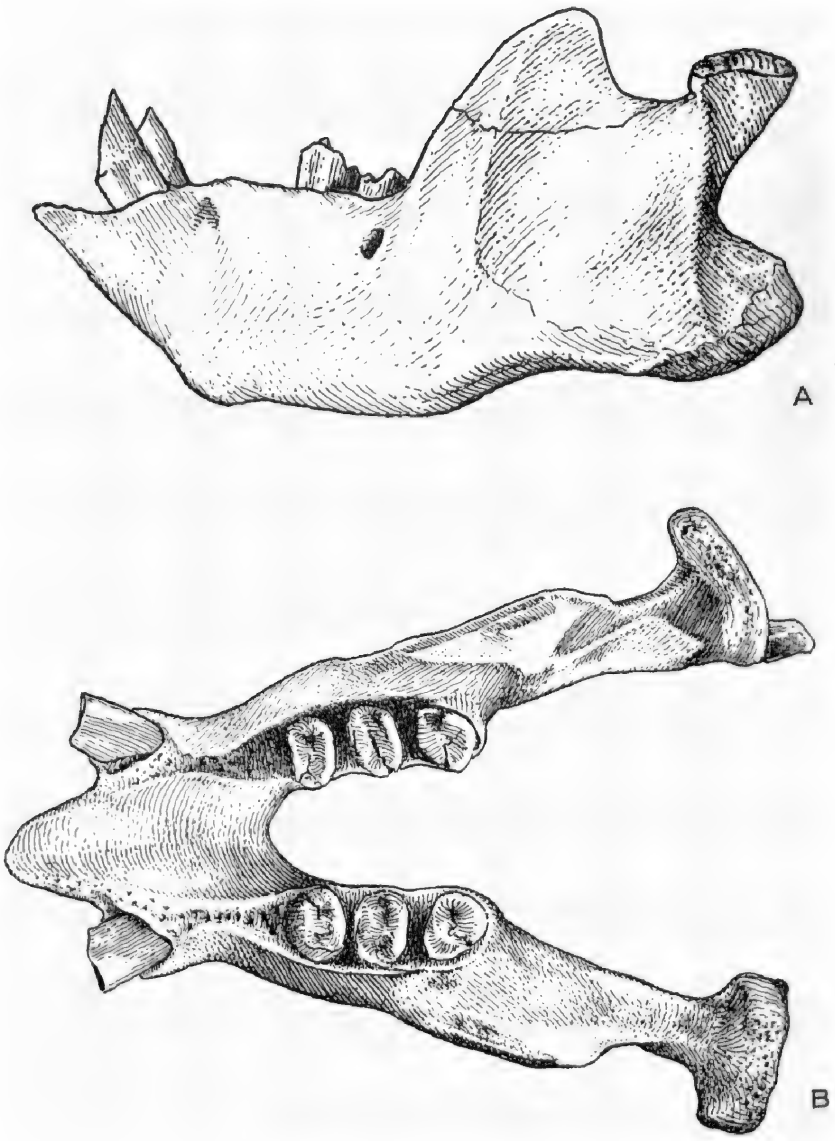

FIG. 18. *Acratocnus odontrigonus* Anthony, 1926, A.M.N.H. No. 17717, mandible; Cueva de la Ceiba, near Utuado, Puerto Rico. From photographs. A. Left side view. B. Top view. ×⅞.

M.N.H.N. No. 1881-28, left mandibular ramus without teeth, with distal end of symphyseal tongue incomplete and lacking angular and coronoid regions, collected by Pinart in a cave in the bay of Samaná, Haiti, and classified by Hoffstetter (1955, p. 101) as *Acratocnus* cf. *comes* Miller.

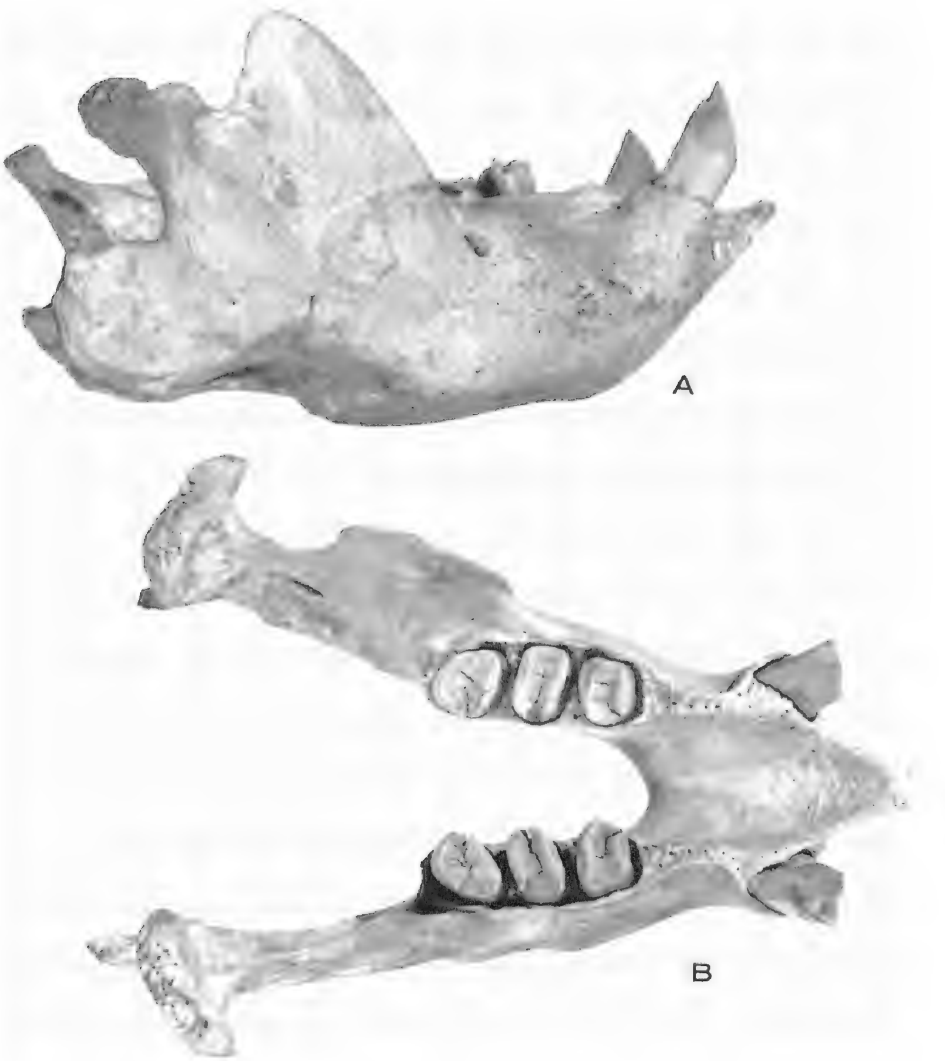

FIG. 19. *Acratocnus odontrigonus* Anthony, 1926, A.M.N.H. No. 17717, lower jaw; Cueva de la Ceiba, near Utuado, Puerto Rico. A. Right side view. B. Top view. ×⅜.

The association of these diverse elements in one hypodigm is made by comparison with what is known of *Acratocnus odontrigonus,* a species to which *Synocnus comes* more particularly resembles. The same may be said of the hypodigm of *Parocnus serus,* relative to *Mesocnus browni.*

DIAGNOSIS: Only known species of the genus. Size small, more or less as in *Acratocnus odontrigonus.* Measurements were given by Miller (1929a).

DISCUSSION: The fragmentary upper part of a skull and a partial pal-

FIG. 20. *Acratocnus odontrigonus* Anthony, 1926, A.M.N.H. No. 17719, lower jaw; Cueva de la Ceiba, near Utuado, Puerto Rico. A. Right side view. B. Top view. ×1.

ate, found in a small cave near St. Michel, were also cited by Miller (1929a, p. 30) who was unable to classify them either as *Parocnus* or as what he thought doubtfully to be *Acratocnus*.

The great width of the skull fragment under consideration distinguishes it at first sight from the respective parts of the skulls of *Acratocnus* and *Mesocnus*, though it agrees well with the width of the mandibular fragment cited above which resembles, to a certain extent, the corresponding part of *Acratocnus*. The fragment is from a skull very distinct

from that of *Acratocnus* and that of *Mesocnus,* though more approximate morphologically to that of this last-cited genus. The lateral walls of the skull, behind the postorbital processes, run parallel to each other owing to the complete absence of the deep postorbital constriction which constitutes one of the most noticeable features in the skull of *Acratocnus.* The upper surface of the rostrum is more elevated relative to the frontals than in *Mesocnus.* The upper surface of the cranium is almost flat, instead of bearing the conspicuous swelling present in the skull of *Mesocnus.* The sagittal crest is present but weak, opposed to the exceptionally strong sagittal crest of *Acratocnus;* in *Mesocnus* it is virtually absent. The postorbital process is weak and somewhat roundish (a condition similar to that of *Mesocnus,* but very different from that observed in *Acratocnus* which has a strong postorbital process); it is situated in a position noticeably more anterior than in *Mesocnus* relative to the anterior border of the orbit.

According to what is shown by the incomplete alveolus, the caniniform tooth (M^1) was certainly very strong, much stronger than in *Mesocnus,* and apparently directed more forward than in this genus (another character that seems to agree well with the mandible, U.S.N.M. No. 293836).

The nasal fossae are narrow and quite elongate, their superior surface being convex as in *Acratocnus* and *Mesocnus.* The frontal sinuses are enormous. The width between the postorbital processes is about 65 mm.

The mandibular fragment (U.S.N.M. No. 293836) includes the symphyseal region, completely ossified, part of the right ramus with alveoli of M_1 (caniniform) and M_2, and anterior part of the alveolus of M_3 as well as the anterior region of the left ramus with a portion of the alveolus of left M_1. At first sight, this fragment is very suggestive of the corresponding part of the mandibles of *Acratocnus* and *Miocnus.* It is, however, much wider and stronger than in *A. odontrigonus* and *M. antillensis.* Anterior to M_2 it is, relatively and absolutely, much more extensive than in these cited species. The symphysis is prolonged posteriorly to the middle of the diastema between M_1 and M_2 (in *Acratocnus* and *Miocnus* the posterior limit of the symphysis coincides with the transverse plane which passes through the anterior face of M_2). The diastema between M_1 and M_2 is larger, and the depression or external concavity of the mandibular ramus immediately behind M_1 is much less accentuated than in *Acratocnus* and *Miocnus,* the thickness of the mandibular ramus being much larger at that point than in these cited genera. The inferior part of the symphysis is plane and wide (in *Acratocnus* it is transversely a little convex, being almost plane or barely convex in *Miocnus*). The bending forward of the

FIG. 21. *Synocnus comes* (Miller, 1929), new combination, U.S.N.M. No. 293836, anterior part of lower jaw; Cave near St. Michel, Haiti. A. Right side view. B. Top view. ×1.

plane of the symphysis is much more accentuated than in *Acratocnus* and *Miocnus*. This is also the case with M_1 which is much stronger and noticeably more procumbent than in these two cited genera. The symphyseal tongue differs markedly from that of *Acratocnus* and is more suggestive of that of *Miocnus*, though also different from it. In *Acratocnus*, as well as being much shorter and narrower, the symphyseal tongue is much less procumbent, being directed obliquely upward, with its antero-inferior surface virtually plane anteroposteriorly and meeting the lower border of the mandible at an angle of about 135 degrees. In the mandible under consideration the symphyseal tongue, as well as being much wider and

FIG. 22. *Miocnus antillensis* Matthew, 1931, A.M.N.H. No. 16880, incomplete lower jaw, type; Casimba, Sierra de Jatibonico, Cuba. A. Right side view. B. Top view. ×1.

more elongate, bears a very different aspect; it is turned forward. Its antero-inferior surface, plane or slightly convex anteroposteriorly, is much more procumbent than in *Acratocnus,* meeting the inferior border of the mandible at an angle of about 155 degrees.

The alveolus of M_1 is roughly triangular in outline as in *Acratocnus* and *Miocnus,* but its antero-inferior edge meets the lateral edges at right angles, a condition very different from what is seen in *Miocnus* (in which the same edge meets the internal one at an acute angle), but very close to what is observed in *Acratocnus.* The alveolus, turned somewhat outward and much stronger than in *Acratocnus,* is separated from the internal border of the mandible by a short diastema absent from the mandible of *Acratocnus,* in which the alveolus of M_1 coincides with the internal border of the mandible. The alveoli of M_{2-3} are subquadrangular in out-

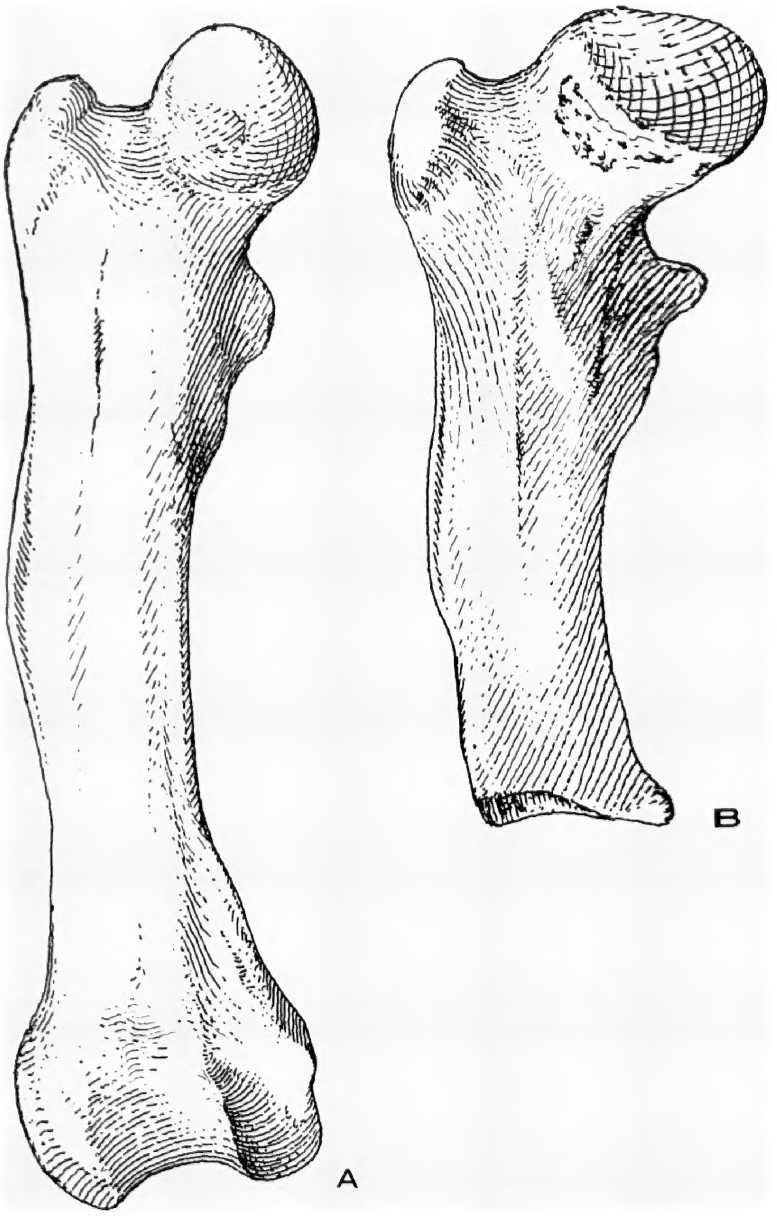

FIG. 23. Right femora, anterior views. A. *Acratocnus odontrigonus* Anthony, 1926, A.M.N.H. No. 17711. B. *Synocnus comes* (Miller, 1929), new combination, U.S.N.M. No. 253178, type. From photographs in Miller. Both ×1.

line, as in *Acratocnus* and *Miocnus,* and somewhat more obliquely set relative to the lateral walls of the mandibular ramus than in these genera.

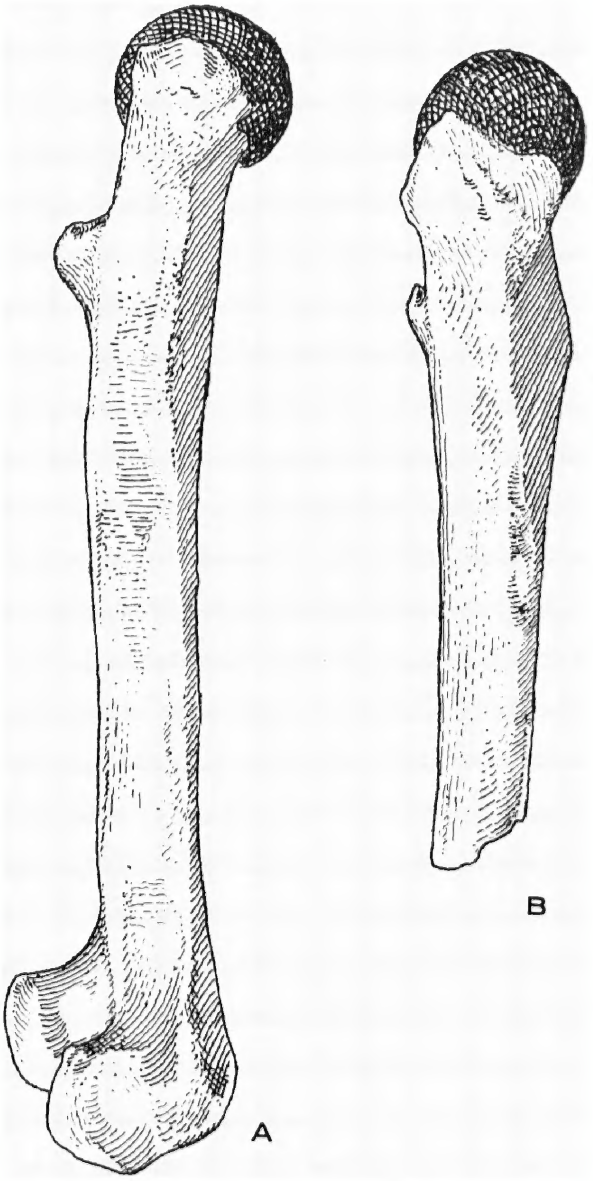

FIG. 24. Right femora, external views. A. *Acratocnus odontrigonus* Anthony, 1926, A.M.N.H. No. 17711. B. *Synocnus comes* (Miller, 1929), new combination, U.S.N.M. No. 253178, type. From photographs in Miller. Both ×1.

A large mental foramen is present at the lateral part of the base of the symphyseal tongue between the symphysis and the alveolus of M_1 as in *Miocnus;* another foramen, much smaller, is seen slightly in front

of the principal one on the lateral wall of the symphyseal tongue. (In *Miocnus,* this foramen is also present, in some cases only in one side, as may be seen in A.M.N.H. No. 16880. Another small foramen, posterior to the larger one, is very near the symphysis at the base of the symphyseal tongue. In *Acratocnus* there is a tendency to a greater proliferation of the secondary foramina.)

TABLE 3

COMPARATIVE MEASUREMENTS (IN MILLIMETERS) OF *Synocnus comes* AND *Miocnus antillensis*

	U.S.N.M. No. 293836, *Synocnus comes*	A.M.N.H. No. 16880, *Miocnus antillensis*
Height under M_2	40	34
Height at posterior end of symphyseal region	37	30
Thickness at posterior end of symphysis	27.5	21
Thickness under M_2	24.2	18.8
Length of symphysis	60	50
M_1		
Length of alveolus	13[a]	—
Width of alveolus	11.8[a]	—
M_2		
Length of alveolus	10[a]	—
Width of alveolus	14[a]	—
M_3		
Length of alveolus	9.5[a]	—
Width of alveolus	15.5[a]	—

[a] Approximate.

The femur differs clearly from that of *Acratocnus* in at least two respects which, after Miller (1929a, p. 26), are important enough to indicate specific or possibly even generic distinction: (1) the intertrochanteric ridge is similar in position and development to the corresponding structure in *Acratocnus* but bears a large and conspicuous tubercle situated at the middle of the shaft at a level slightly below the lesser trochanter (this tubercle, absent from *Acratocnus,* forms the culmination point of a general thickening of the bone which, viewed from the side, imparts to the upper fourth of the shaft a strongly angular-convex profile instead of the flat or gently concave profile of the same region in *Acratocnus*); (2) the neck of the femur is shorter than in *Acratocnus* and is less bent outward and forward from the axis of the upper half of the shaft.

MIOCNUS MATTHEW, 1919

Miocnus DE LA TORRE AND MATTHEW, 1915, p. 152 (*nomen nudum*). MATTHEW, 1919a, p. 168; 1919b, p. 660; 1931, p. 3.

Acratocnus: PAULA COUTO, 1959, *in* Matthew and Paula Couto, 1959, p. 40, *nec* Anthony, 1916.

TYPE SPECIES: *Miocnus antillensis* Matthew, 1931.

DISTRIBUTION: Pleistocene. Cuba.

DIAGNOSIS: Size medium. Mandible short, massive, much less elongate than in *Mesocnus,* slightly convex under M_{2-4}. Symphyseal tongue gently decurved as in *Mesocnus,* but much shorter, antero-inferior surface slightly concave anteroposteriorly, becoming flat from base of symphyseal tongue to distal end of symphysis. Masseteric fossa strong and deep. Angular region probably not very salient, placed at a level a little above that of dental row. Condylar region considerably raised above alveolar border, wide; condyle as high as in *Megalocnus.* Teeth relatively large. Upper caniniform tooth (M^1) strongly curved, triangular in cross section, and obliquely worn posteriorly. Lower caniniform (M_1) semicircular or semilunar in cross section, obliquely worn anteriorly. M_{2-3} roughly quadrangular or elliptical in cross section; M_4 roughly subcircular. M_{2-4} not obliquely set. Humerus somewhat elongate, with weak deltoid and pectoral crests, and somewhat massive entepicondyle.

DISCUSSION: Besides being fragmentary, the material referred to the type and only known species of this genus is still scarce. It is represented by the type mandible, reduced to its horizontal rami; a left mandibular ramus, broken at the alveolus of M_2, but with condylar and angular regions almost complete and M_{3-4} preserved; another mandibular fragment; some isolated teeth; and a few bones of the extremities. Nothing more is known of it, except the material recently collected by the Sociedad Espeleológica de Cuba, still undescribed.

Among this last-cited material is a still unprepared skull, partially covered by calcareous incrustation, of which Prof. Oscar Arredondo sent me a picture and schematic drawings. The position and orientation of its upper caniniform tooth (M^1) are identical to those seen in *Acratocnus,* but the skull is very different in shape from that of this cited genus, particularly in its postorbital region which has no lateral constriction. M^2 and M^5 are also very different from those of *Acratocnus* in cross section.

In 1951, when I revised the collection of ground-sloth material from Cuba in the American Museum of Natural History, to complete Matthew's monograph on the subject, I considered *Miocnus* as a synonym of *Acratocnus* on the basis of existing similarities between the scarce remains of *Miocnus* and the corresponding parts of *Acratocnus.*